From the house of **Amar Chitra Katha** and **Tinkle**

BRAINWAVE™

SCIENCE IS JUST A GAME

Vol. 02 Issue 03
March 2013
48 pages
8-15 years
₹60

p45
BW Fun-do Band!

You can score 100/100 in science while playing!

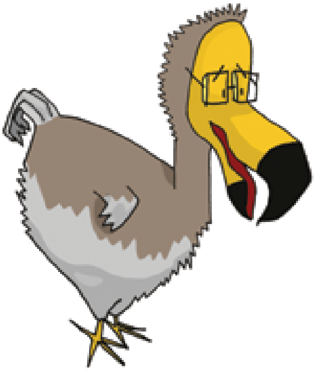
p45
Superteacher Awards

- 11 pages of comics
- 5 fun-do activities
- 13 gifts to be won

- p24 Grab your poster
- p27 Be a 'Smartenstein'
- p47 It's Sci-Q Time

p11
Underwater World

MEET THE SMARTIES

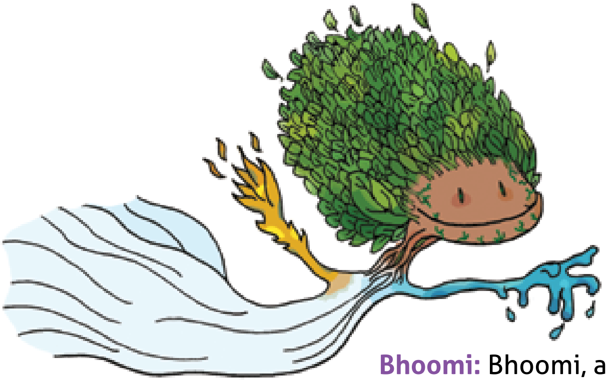


Dr. Dodo: Dr. Dodo is the co-founder of BW Labs and is the last living dodo. He holds a PhD in anachronomaly and parallel universes from the University of Clockwindistan. He invented the Galileo series of time machines.

Skree!: Skree! is the other founder of BW Labs. She loves dangerous experiments. She makes mini black holes before breakfast and has dark matter for lunch.

Arby: Arby is a genius who will grow up to be Aryabhata. He came to the future, thanks to Dr. Dodo's time machine. He is a fan of numbers, banana fritters and robot wars.

Alby: Alby will grow up to be Albert Einstein. However, now, like Arby, he too has been sucked into the future. When he is not researching, he plays the violin.



Bhoomi: Bhoomi, a.k.a. Bhoo, is an enigma. No one knows where she is from and how she came into being. She is made up of earth, wind, fire, and water in equal parts. Her alter-ego is Gaia Goel, a world famous science sleuth.

Read more at www.bwmag.in/meet-the-smarties

Dive Right In!

Dear Reader,

Ever since I began working with Brainwave, I realised that the best part of writing for children is all the learning I get. While researching for this issue, I found out that although we think we know a great deal about the underwater world, in reality, we know only a fraction of what actually exists.

That beautiful, underwater adventure movie, *Finding Nemo* has spoken of marine life, ocean currents, mines and missiles, scuba divers, corals and the dark and mysterious ocean floor. But is that all we know? Maybe not. Dive right in and explore!

Scientifically,
JD, *jayadev.calamur@ack-media.com*

Cover artwork by **Kashmira Sarode**

No part of this magazine may be reproduced without the express consent of Amar Chitra Katha Private Limited (ACK). Any reproduction, modification, distribution, transmission, republication, display or exploitation in any way of the content(s), in whole or in part, of this magazine is strictly prohibited. ACK makes no warranties or guarantees, express or implied, written or oral, as to the contents of the magazine, the information, materials or opinions, included in this magazine. In no event shall ACK be liable for damages of any kind arising as a consequence of using or following any method or formula as mentioned in the magazine, including but not limited to direct, indirect, incidental, punitive and consequential damages.

Subscriptions:
brainwave@ack-media.com

Consumer Complaints:
+91-22-6629 6999
customerservice@ack-media.com

Advertising Sales:
sm.meenakshi@ack-media.com

Credits:
Carisa R & Jayanthi V
Hemant Birwadkar
Heta Desai
Janak Fotaria
K.K. Arun Kumar
Mirnalini Surendran
Narayan Mahale
Rajesh Pathak
Sagar Sawant
Sandeep Shivdasan
Shilpi Mathur
Shrikant Wagle
Swati Gupta
Subhir Rao
Yogesh Gautam

VP Operations
Sandeep Padoshi

Digital Business Head
Shubhadeep Bhattacharya

BRAINWAVE™
Vol. 02 | Issue 03 | March 2013

Editor
Jayadev Calamur
jayadev.calamur@ack-media.com

Consulting Editor
Vandana U
vandana@ack-media.com

Designer
Kashmira Sarode
kashmira.sarode@ack-media.com

Jr. Designer
Saudamini Tambay
saudamini.tambay@ack-media.com

Resident Geek
Kayomarz Bacha
kayomarz.bacha@ack-media.com

Founding Editor
Vinayak Varma

Advisory Board
Arvind Gupta
Scientist & Educator
Hari Parameswaran
Scientist & Educator
Dr. Chandrakant Shukre
Astrophysicist
Maya Menon, *Director*
The Teacher Foundation
Geetha Narayanan, *Director*
Srishti School of Art, Design & Technology
Dr. AS Manekar, *Director*
Nehru Science Centre, Mumbai
Dr. Balaji Sampath
Aid India Foundation
Siddharth Rao, *Director*
Agumbe Rainforest Research Station

Brainwave Business Head
Sasikanth Chemalamudi
sasikanth.c@ack-media.com

Brainwave is Printed and Published by Vijay Sampath **on behalf of** Amar Chitra Katha Private Limited **Printed at** Indigo Press (India) Pvt. Ltd., Plot No. 1, C/716, Opp. Dadoji Konddeo Cross Road, Byculla (E), Mumbai 400027 **Published at** Krishna House, 3rd Floor, Raghuvanshi Mills Compound, Senapati Bapat Marg, Lower Parel (West), Mumbai 400013.

Copyright © 2013, Amar Chitra Katha Private Limited. All rights reserved.

Vol. 02 | Issue 03 | March 2013

BRAINWAVE™

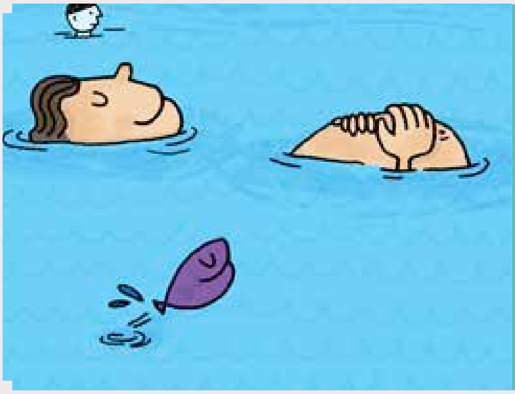
CONTENTS

COVER STORY 11

■✚

UNDERWATER WORLD

In which we splash, dive, swim and submerge ourselves to understand the beauty and the mysteries of the underwater world.



DO AND LEARN

■ p.04 Toybox★
■ p.19 Eye See★
■✚ p.22 Third Law★
■✚ p.44 Practical Science
✚ p.30 DIY★
▲■ p.35 Magic Science★
▲■ p.35 Planet Ninjas★

Aptitude guide: ▲ Beginner ■ Medium ✚ Advanced ● Common

FREEBIES

p.24 Poster

READER CONTRIBUTION

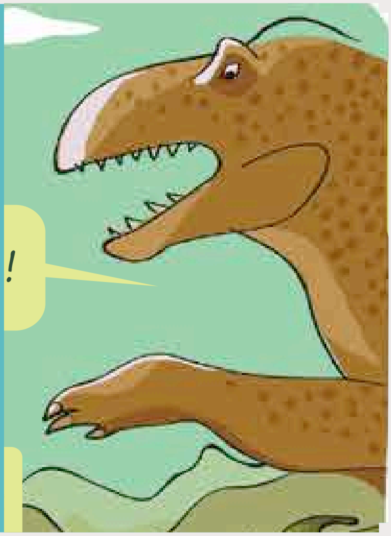
- ● p.26 Fan Fiction ★
- ● p.27 Solutions & Winners
- ● p.27 Letters from Readers

FUN-DO FACTS

- ■ ✚ p.18 Nuts & Dolts
- ● p.23 Story Storeys
- ● p.34 Wacky Tech
- ● p.42 Celeb Science

COMICS

- ▲ p.06 Toon Talk
- ● p.08 History Maker
- ▲ ■ p.20 The Smarties
- ✚ p.28 Multiverse
- ■ ✚ p.38 Science Fiction



KNOW IT ALL

- ● p.07 Ask Us Why ★
- ■ ✚ p.10 Flash News
- ✚ p.32 Geek Speak
- ● p.36 Animalia
- ● p.43 Golden Gizmo

CONTESTS

- ● p.27 Be a Smartenstein ★
- ● p.45 BW Fun-do Band ★
- ● p.45 BW Superteacher ★
- ● p.46 Treasure Hunt ★
- ● p.47 Sci-Q Time! ★

Words tagged with **G** have been explained on page no. 47.

★ Win a gift!

The Deep-Sea Diver

Make a simple toy and understand how scuba divers swim into deep oceans.

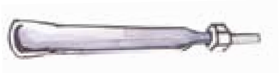
by **Arvind Gupta**
& **Kayomarz Bacha**

To make this, you need:

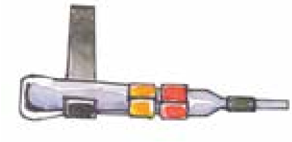
- An empty 2 litre bottle
- An ink dropper (available at a stationery store for Rs. 5)
- A small hex nut (available at a hardware store for Re. 1)
- Coloured tape or thread
- Blue ink
- A plastic mug

Method:

Step 1
Make the dropper heavy by fixing the hex nut to its base. This will help the dropper stand vertically in water.

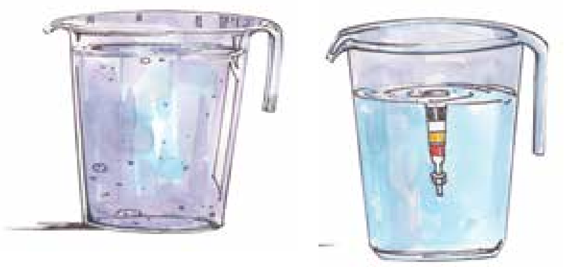


Step 2
Decorate the dropper as you like using the tape or thread. Here we have tried to make it look like a scuba diver!



Step 3
Take a mug filledof water. Fill the dropper with some water and place it in the mug.

Note:
The dropper should not sink or float above the surface of water. It should float exactly as shown in the image.



Artwork: Adarsh Achari

http://www.youtube.com/watch?v=NUydQ1qCi3c

Step 4

Now fill the 2 litre bottle with water to the brim and add a little blue ink.

Step 5

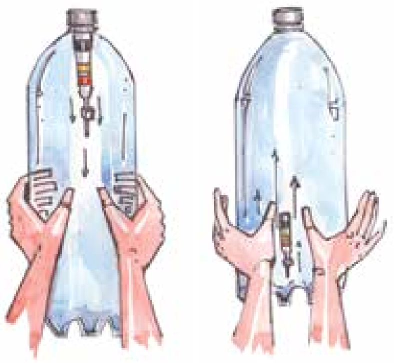
Remove the dropper from the mug and place it in the bottle.

Step 6

Screw the bottle cap on as tight as you can.

Step 7

Place the bottle on a flat surface and press the bottle on the sides. Note what happens to the 'diver.' If nothing happens, press the bottle harder.



Your deep-sea diver is ready. It will be a beautiful addition to your study table or living room. Go and amaze your friends!

Note:

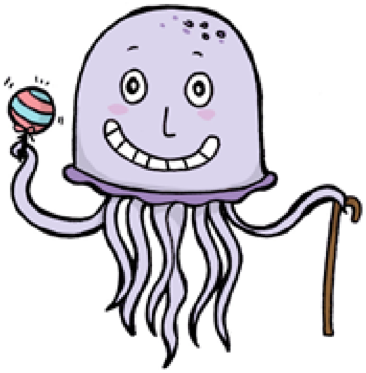
Decorate the bottle by painting fish, other sea creatures, water plants, etc. on the sides of the bottle.

Why does this happen?

Squeezing the bottle forces water into the ink dropper and the dropper's density increases. This, when combined with the weight of the hex nut makes the 'diver' sink. On releasing the bottle, the water moves out of the dropper. This causes the 'diver' to become less dense and float back to the surface.

Compete with your friends and see how long you can balance the 'diver' in the middle of the bottle. Try placing 2-3 divers in the bottle and see how each behaves.

Send your observations, photographs and videos to *kayomarz.bacha@ack-media.com*
You can win the upcoming BW DIY e-book worth Rs. 200!



Turritopsis nutricula, the immortal jellyfish can pull off an amazing age-reversal stunt by going from a fully-matured state to infancy, starting the game of life over and over again. What the fish!

Most liquids become dense and heavy when they solidify, but not water. Water expands in volume when it freezes. Hence, ice has lesser density than water. That is why icebergs float in water.

I KNOW WHERE YOU'RE HIDING!

Heard of the platypus, an underwater sea creature? Move a muscle and this guy's onto you instantly. A superpower called 'electroreception' allows the platypus to zero in on its prey by sensing electric fields generated by muscular contractions. And it can manage all this in the deepest and darkest of waters!

Artwork: Alicia Souza

A Different View

Alok Deshpande asks, "How is underwater photography possible?"

by **Srinath Perur**

Artwork: Nimisha Saikia

When light from an object enters our eye, the eye acts as a lens that focuses light passing through it as images on our retina[G]. That is how we are able to see. This lens is powerful when light passes into it from a thinner medium such as air but is not as efficient in a denser medium such as water. Underwater, images are focused far behind the retina, resulting in a blurred vision. Because water is denser than air, the refractive index[G] varies, resulting in faulty vision.

Keeping this principle in mind, if the right equipment is used, underwater photography is possible. Some of the best images published in popular science magazines are underwater images. Underwater cameras have a layer of glass and air in between the water and the lens and hence, work well.

Photographers wear flat diving masks to take pictures under water. These masks separate the human eye from the water by a layer of air, making viewing easy. Underwater photographers are careful with their equipment and ensure that their cameras do not capture moisture.

Cameras made for land use can also 'see' underwater when protected with special casing. The material used for casing can range from inexpensive plastic to highly priced aluminium.

But, there are issues too with underwater photography. As you go deeper, there is less light available and water absorbs colours such as red and orange. So, a special underwater flash may have to be used. Also, because light passes from water to air before entering a camera, everything appears bigger and closer. ■

Some popular underwater gadgets:

- Underwater watches
- Underwater headphones and mp3 players
- Underwater mobile phones
- Underwater 3D cameras for filming movies in high definition

Have a burning question? Email to *brainwave@ack-media.com* with 'Ask Us Why' as the subject. The best question will win the latest Amar Chitra Katha animation CD!

A TITANIC SINK

Written by Jayadev Calamur
Artwork by Parvati Pillai

The RMS Titanic at its time was the world's most famous ship because she was the largest passenger ship to sail from England to the United States. She had 2,224 passengers aboard. The legend of The Titanic is still discussed a hundred years after she sank into the Atlantic Ocean.

The Titanic embarked on her journey from the British port of Southampton to New York City on April 10, 1912.

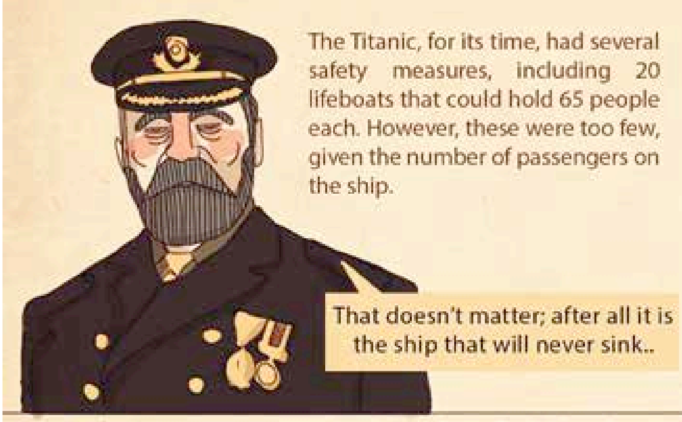
How I wish I were on the Titanic!

News about the voyage made it to the front page of every newspaper. The reason for the hype was the Titanic's size. It took 15,000 workers and 26 months to build her! At 883 feet long, 93 feet wide and 104 feet tall, she was the largest ship in the world!

ALK ABOUT RAIN-
HOLIDAY ISLE!
THE EVENING SUN
ALL TITANIC PASSENGERS ARE SA
TRANSFERRED IN LIFEBOATS AT
My goodness, what a magnificent ship!

On the day she was inaugurated, 22 tons of soap and wax were used to wash and polish the ship.

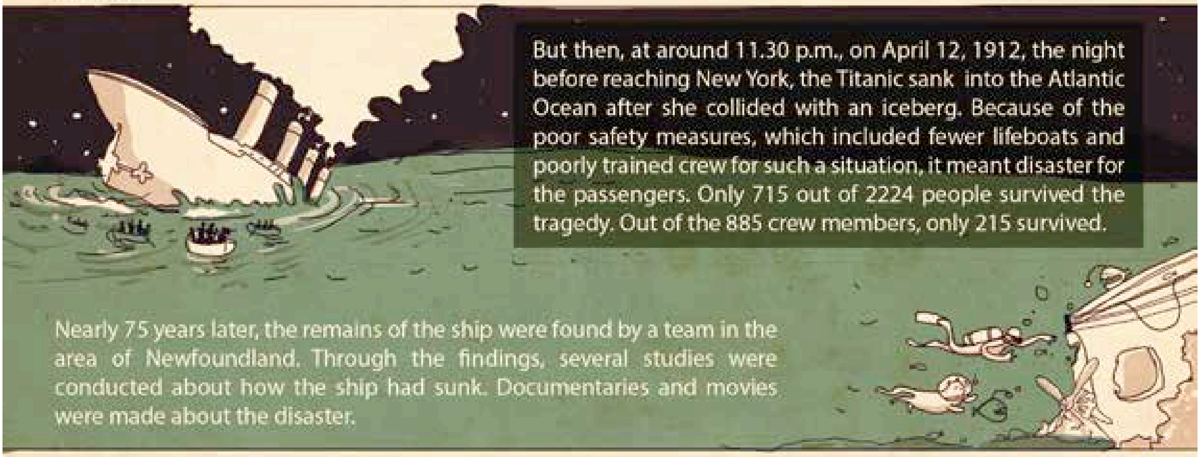
The Titanic, for its time, had several safety measures, including 20 lifeboats that could hold 65 people each. However, these were too few, given the number of passengers on the ship.


That doesn't matter; after all it is the ship that will never sink..

And then the Titanic set out on its voyage.

I'm the king of the world!

For the first two days, people on board the Titanic enjoyed themselves. The First Class compartments were stacked with luxury and comforts. The regular compartments too were made comfortable and people frolicked.



But then, at around 11.30 p.m., on April 12, 1912, the night before reaching New York, the Titanic sank into the Atlantic Ocean after she collided with an iceberg. Because of the poor safety measures, which included fewer lifeboats and poorly trained crew for such a situation, it meant disaster for the passengers. Only 715 out of 2224 people survived the tragedy. Out of the 885 crew members, only 215 survived.

Nearly 75 years later, the remains of the ship were found by a team in the area of Newfoundland. Through the findings, several studies were conducted about how the ship had sunk. Documentaries and movies were made about the disaster.

Two years after the Titanic sank, a global treaty called International Convention for Safety of Life at Sea was signed. Nations bound by this treaty have ensured safety standards of ships. To monitor icebergs, the International Ice Patrol was also set up. Since then, only 15 ships have sunk in 100 years, due to such mishaps. **Ship safety norms today are so strong that a luxury ride in a cruise liner is one big party!**

Are We Alone?

For the longest time, it was thought that we are the only living creatures in the Milky Way. Now, a team, led by Professor Abel Mendez from the University of Puerto Rico, launched the Habitable Exoplanet Catalogue in December, 2011 to list out planets outside the Solar System that could support life.

Professor Mendez and his team discovered that there are seven planets outside the Solar System that can support life. These life-supporting planets have been assessed using the Earth Similarity Index [G], the Habitable Zones Distance [G], the Global Primary Habitability [G] and comparing these planets to the Earth's past and present. Despite the excitement, Professor Mendez says that the research is primary.
Source: The Daily Mail ■

Underwater Navigation Simplified

Scientists have invented a device that could enable vessels navigate with ease under water. The device is based on the principle of a string of 'feelers' found on the bodies of the Blind Cave fish. This organ enables the Blind Cave fish to sense its surroundings and navigate easily.

Using the principle, which involves a combination of water pressure and computer vision technology, the device gives users a 3D image of nearby objects, and map its surroundings.

This sensor can also replace cameras and sonars in vehicles such as submarines and boats, since it can help navigate in the dark. In addition, the absence of sonars is an advantage, as marine life will not be affected.
Source: www.sciencedaily.com ■

Can We Breathe Underwater as Harry Potter did?

Harry Potter's gillyweed trick may soon be real, as scientists have worked out a way for humans to breathe underwater easily.

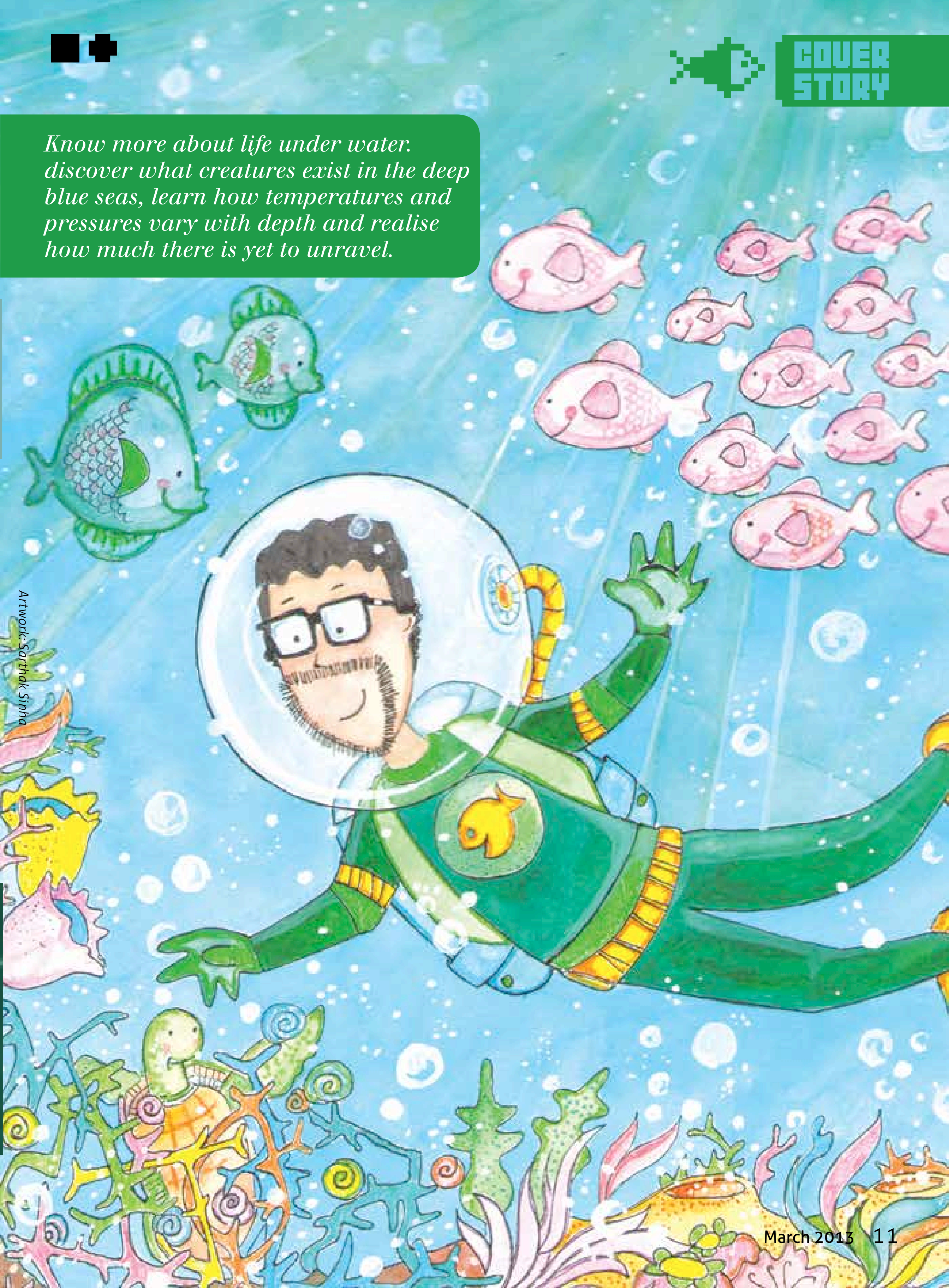
Scientists have discovered this by merging human DNA with the DNA of algae. Experiments conducted on salamanders resulted in the fish having both plant and fish-like characteristics. Scientists hope that advancements of the same process could soon be applied to humans too.

If the experiment is a success, we can perhaps explore the ocean without using a submarine!
Source: National Academy of Sciences ■

Image source: Wikimedia Commons

Snapshot from Harry Potter and the Goblet of Fire - Wikimedia Commons

Know more about life under water: discover what creatures exist in the deep blue seas, learn how temperatures and pressures vary with depth and realise how much there is yet to unravel.



Artwork: Sarthak Sinha

UNDERWATER MARVEL

by **Jayadev Calamur**
Characters created by **Vinayak Varma**
© **Brainwave**

I was standing near the Pacific Ocean admiring its beauty. The calm, blue water took me into a different thinking zone. I started asking myself several questions about water on the Earth, how water came to exist and why other planets in the Solar System, despite having water, could not support life. I wondered whether humans would ever be able to explore the deepest parts of the ocean.

At that very moment, I felt someone push me into the water. I screamed all the way down. I can swim, but have no ocean swimming experience! As I was struggling, a scuba-diving gear materialized from nowhere and attached itself on me, just like Iron Man's suit. I also noticed my suit was connected to a universal supply of oxygen.
I relaxed realizing that whoever shoved me into the water had no intention of hurting me.

I began looking around. The blue waters had a calming effect on me. I then saw someone swim quickly ahead of me. I could not see clearly, but figured that it was the person who shoved me in and followed. The figure waved at me and swam ahead.

Different shaped and sized sea creatures passed by. I saw coral reefs, algae, jellyfish, whales and sharks. Dolphins playfully circled me. The experience was incredible! I had so far only watched underwater adventures on television, but this was so much better!

I then remembered what I was thinking before I was shoved into the water.

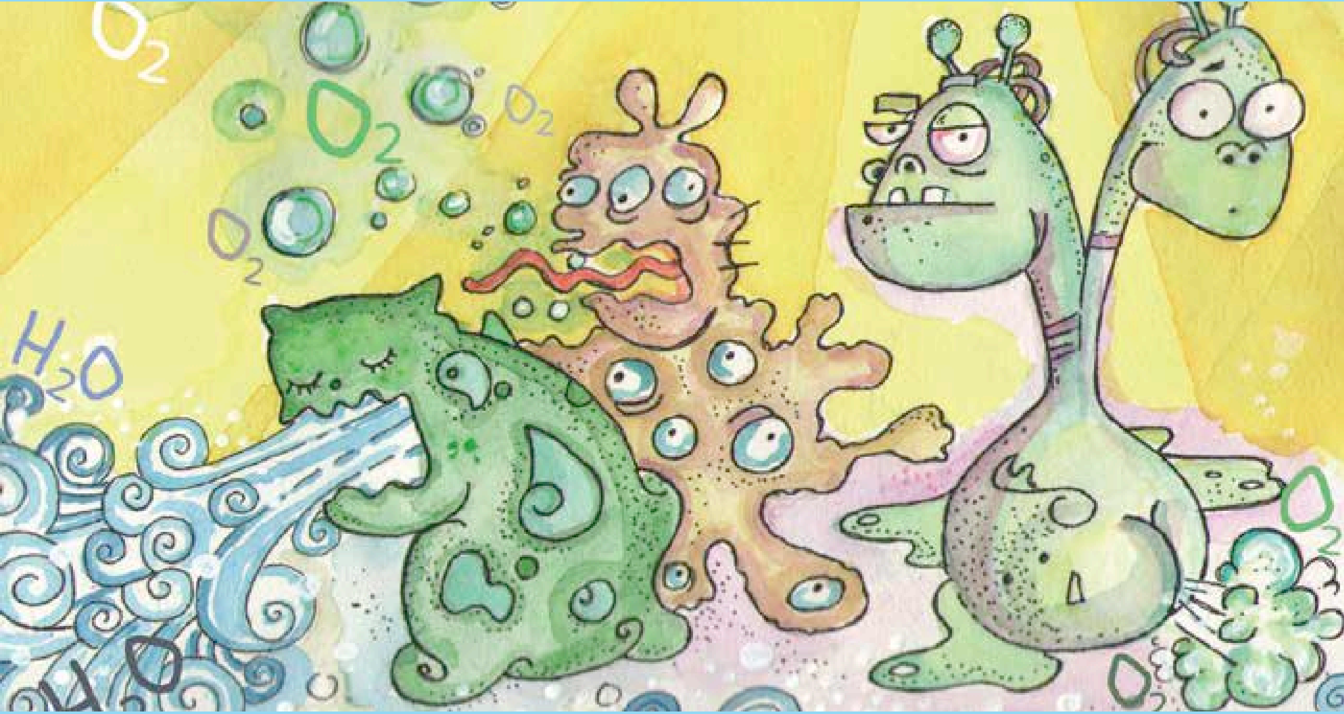
How did water come into existance on Earth? Theories included extra-terrestrial sources, cooling of the planet over billions of years till there was enough pressure for water retention, comets colliding with the Earth and bringing water to the world's oceans, gradual leakage of water stored in hydrous minerals of the Earth's rocks, and photosynthesis.

The concept of photosynthesis seemed the most practical. When the Earth was formed billions of years ago, it was a gigantic ball of gas that took millions of years to cool. At that time, the gases on the Earth were methane, carbon dioxide, water vapour that are fatal to humans. There were microorganisms that synthesized methane in order to survive.

One day, the Earth ran out of methane. Many organisms became extinct because of this. However, some lucky ones, thanks to evolution, had grown a pigment known as chlorophyll to synthesize carbon dioxide in the presence of sunlight. This process of photosynthesis meant the birth of oxygen. The water thus released, over billions of years, became seas and oceans.

I was jolted out of my memory as I could no longer see my abductor. I looked around in panic and finally noticed it swimming below me, going deeper. I tried to follow, but could not do it beyond 100 feet. Left with no other option, I kept swimming straight. I could not help but wonder how marine life manages to survive so deep. In fact, microscopic algae contribute a larger proportion of the world's photosynthetic output, more than all the terrestrial forests combined!

I could not ascertain how deep the ocean was.



The deepest parts of the ocean floor are called trenches – the deepest of which is the Mariana Trench[G] in the Pacific Ocean. The Mariana Trench is approximately 10kms deep! But, scuba divers can only go to depths of up to 200-300 feet. Even the best of manned submarines can dive only up to 1500 meters.

As we go deeper, the temperature drops and pressure increases. Beyond 200 meters, sunlight cannot penetrate water and temperature drops to even zero degrees Celsius! At these depths, bioluminescence is probably the only form of light. And due to the lack of sunlight, photosynthesis cannot occur. Also, with every 10 meter increase in depth, water exerts an additional pressure of 1 bar[G] on our chest and lungs making it impossible to breathe normally.

I wondered how plants and animals live at such depths? It would be difficult to obtain food and energy if there is no photosynthesis, right? I recalled that at such depths, food comes from decomposed parts of animals that sink to the bottom. Plants and animals get energy by breaking down minerals and chemicals that are released by the hydrothermal vents and geysers.

Hydrothermal vents are openings in the seafloor out of which heated mineral-rich water flows. Geysers are jet-like water and water vapour springs erupting from openings in the Earth. Water gushing out from the Earth heats up as it moves through volcanic terrain, forming geysers. About a 1000 known geysers exist worldwide! Volcanic terrains are a necessity for the formation of geysers and volcanoes are a common occurrence on the ocean floor. As we have already read, 90% of volcanic activity on Earth occurs in oceans!

Artwork: Sarthak Sinha

As I continued swimming underwater, many other questions popped into my head. How do animals breathe and hear underwater?

Not all marine animals have gills. Whales and dolphins are mammals that respire through lungs, just like us. The only difference is that these creatures have spouts on the top of their heads. These spouts collect air and help the mammals breathe under water for long periods of time. While sleeping, they position themselves in such a way that they are at the surface of the water, to collect oxygen.

Producing sound and hearing is necessary for the survival of marine animals - for mating and to ward off danger. Sound travels about five times faster under water than in air. And unlike light that can travel only a few hundred meters in water, sound can travel miles. While marine mammals have ears almost like ours, fishes hear through advanced sensory systems called the 'inner ear' and the 'lateral line system'. The inner ear responds to sound waves and the lateral line system picks up the particle motion close to the source of the sound.

I was excited and curious. I was learning a lot and wanted to explore and learn even more. But swimming for so long had tired me. I felt my body ache. It felt like if I swam another few metres, my shoulders would pop out of their sockets!

Fortunately, I then felt someone pull me up to the surface, but I was too tired to figure out who it was. The next moment, I was ashore. I closed my eyes and lay down there, panting.

"Had fun, JD?" said a familiar voice.

I opened my eyes and looked up. "Bhoo!" I exclaimed. "It was you all along!"

Bhoo laughed. "Of course. I knew that you are working on the cover story and decided to help in my own way. Did you learn enough?"
"I hope so. What I saw was just a fraction of what is there," I replied. "Oceans are divided into 10 zones based on the depth. I did not go beyond 100 feet!"

"Humans haven't been able to explore more than 10% of the oceans. The magic of science isn't it?" chuckled Bhoo.

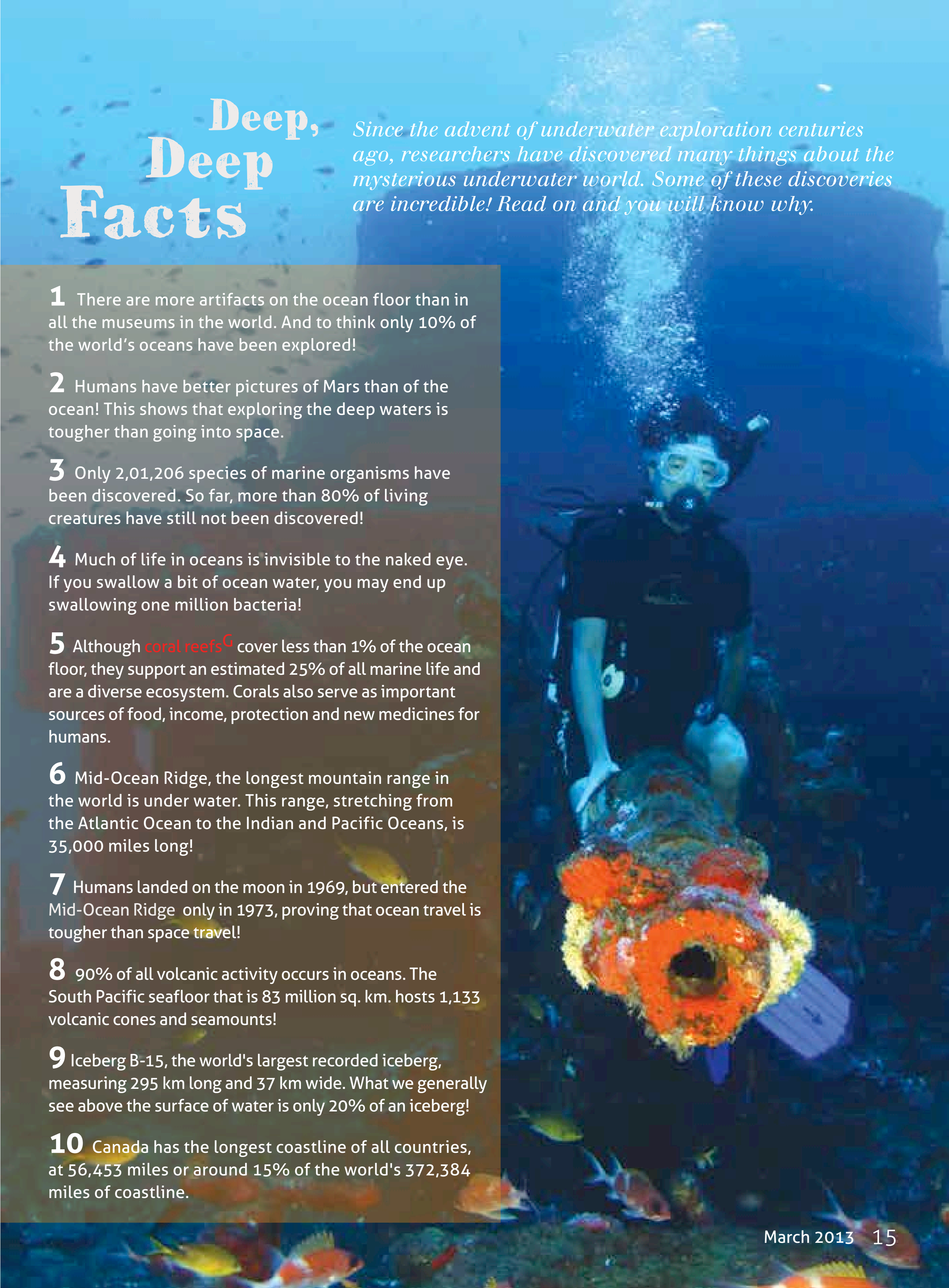
"Indeed," I said, perplexed at the beauty and mystery of the underwater world.

Despite several adverse conditions, life exists in abundance under water.

Since 71% of the Earth's surface is covered with water and the depths are great, oceans have scope to harbour 300 times the volume of terrestrial life! Out of the 8.7 million species estimated to be living on our planet, 50% exist under water. But, more than 91% of these underwater species are yet to be discovered or named! ■

Sorry, I do not have a name yet...
Hi! I am Blue Whale.

Artwork: Sarthak Sinha



Deep, Deep Facts

Since the advent of underwater exploration centuries ago, researchers have discovered many things about the mysterious underwater world. Some of these discoveries are incredible! Read on and you will know why.

1 There are more artifacts on the ocean floor than in all the museums in the world. And to think only 10% of the world's oceans have been explored!

2 Humans have better pictures of Mars than of the ocean! This shows that exploring the deep waters is tougher than going into space.

3 Only 2,01,206 species of marine organisms have been discovered. So far, more than 80% of living creatures have still not been discovered!

4 Much of life in oceans is invisible to the naked eye. If you swallow a bit of ocean water, you may end up swallowing one million bacteria!

5 Although coral reefs[G] cover less than 1% of the ocean floor, they support an estimated 25% of all marine life and are a diverse ecosystem. Corals also serve as important sources of food, income, protection and new medicines for humans.

6 Mid-Ocean Ridge, the longest mountain range in the world is under water. This range, stretching from the Atlantic Ocean to the Indian and Pacific Oceans, is 35,000 miles long!

7 Humans landed on the moon in 1969, but entered the Mid-Ocean Ridge only in 1973, proving that ocean travel is tougher than space travel!

8 90% of all volcanic activity occurs in oceans. The South Pacific seafloor that is 83 million sq. km. hosts 1,133 volcanic cones and seamounts!

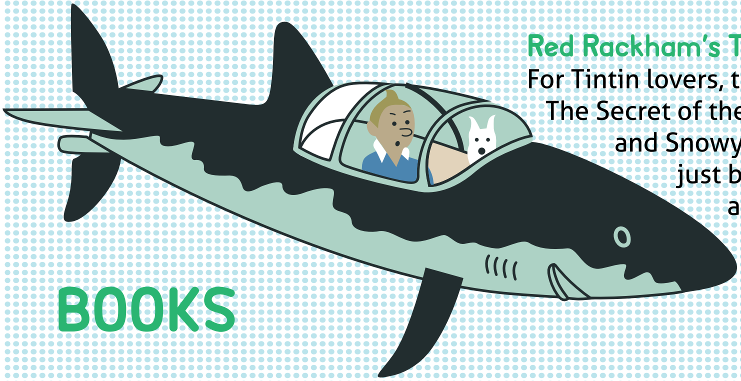
9 Iceberg B-15, the world's largest recorded iceberg, measuring 295 km long and 37 km wide. What we generally see above the surface of water is only 20% of an iceberg!

10 Canada has the longest coastline of all countries, at 56,453 miles or around 15% of the world's 372,384 miles of coastline.

WATER

From underwater civilizations to deep-sea adventures, movie makers and novelists have had thei

Legends about underwater go back to the mystery of Atlantis, a legendary world that sunk underwater ce
writers and filmmakers towards the end of the 20th century, have worked towards making the underwate
read and a must-watch. Let's take a look at some of such classics that have enthralled us.



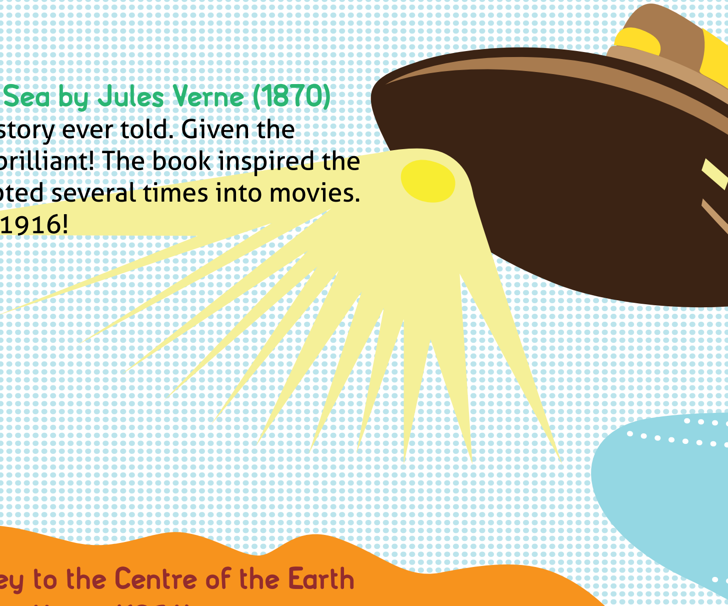
Red Rackham's Treasure by Herge (1944)

For Tintin lovers, this comic book acts as a sequel to The Secret of the Unicorn. Tintin, Captain Haddock and Snowy meet Professor Calculus, who has just built a submarine to travel underwater and search for a hidden treasure. Can't wait to watch the movie? *Brainwave* can't wait either!

BOOKS

Twenty Thousand Leagues Under The Sea by Jules Verne (1870)

This is perhaps the greatest underwater story ever told. Given the time in which it was written, it is simply brilliant! The book inspired the design of the first submarine. It was adapted several times into movies. The first one was a silent movie made in 1916!



Journey to the Centre of the Earth by Jules Verne (1864)

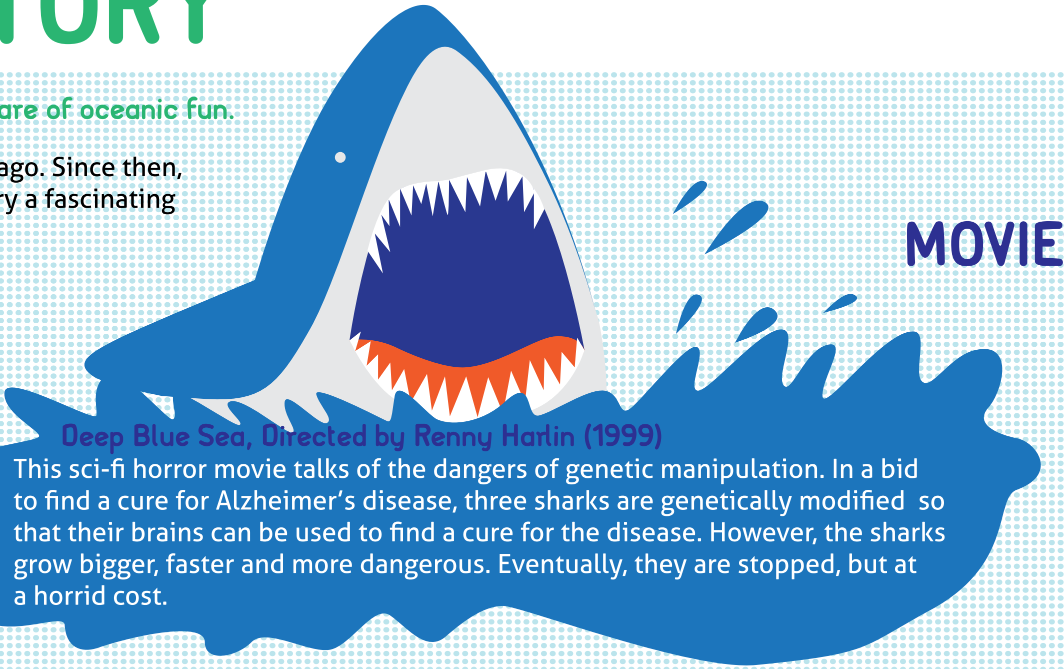
The story is set in Ireland. The protagonists reach the centre of the Earth through a volcanic crater and discover another world. A modern film adaptation of the book was released in 2008 with Hollywood actor Brendan Fraser playing the lead.

STORY

r fair share of oceanic fun.

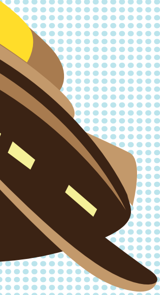
enturies ago. Since then,
er mystery a fascinating

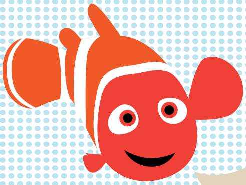
MOVIES



Deep Blue Sea, Directed by Renny Harlin (1999)

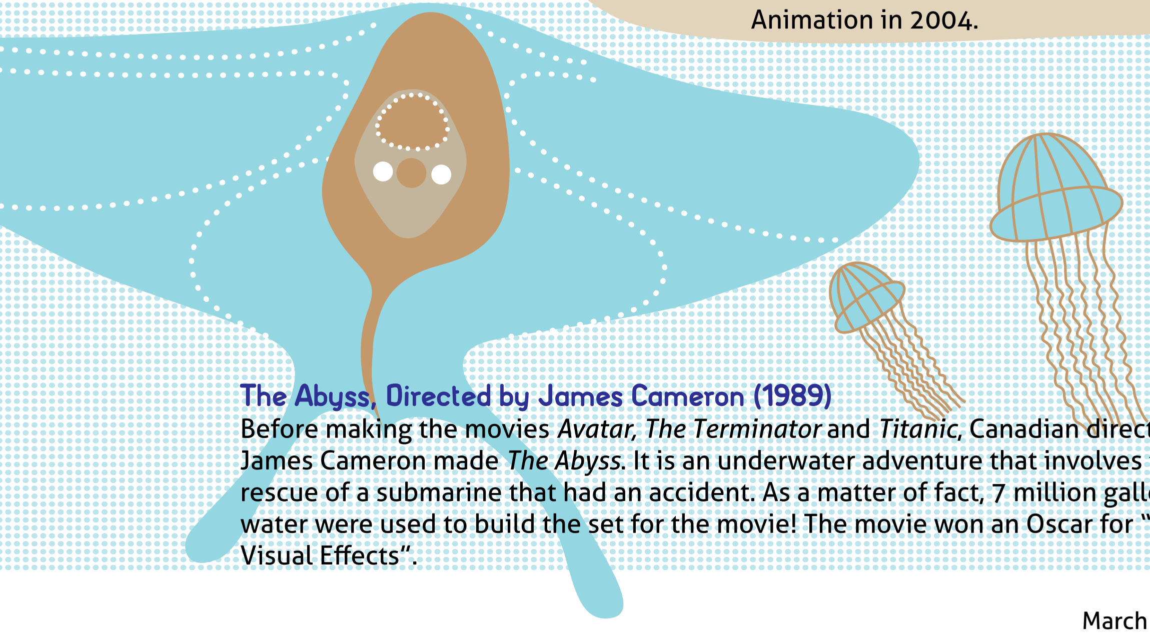
This sci-fi horror movie talks of the dangers of genetic manipulation. In a bid to find a cure for Alzheimer's disease, three sharks are genetically modified so that their brains can be used to find a cure for the disease. However, the sharks grow bigger, faster and more dangerous. Eventually, they are stopped, but at a horrid cost.





Finding Nemo, Directed by Andrew Stanton for Disney (2003)

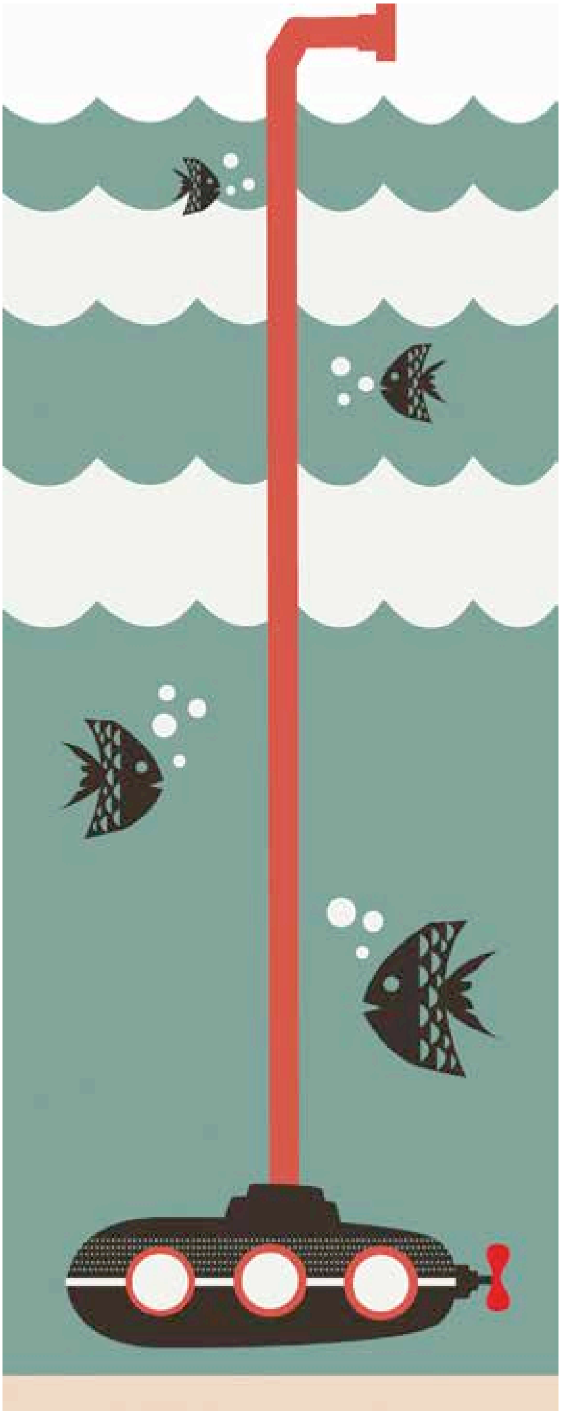
Join a "daddy"-clown fish as he journeys through the oceans to find his missing son. It may not be ***An Atlantis Adventure***, but it is one that involves jellyfish, ocean currents, underwater mines, 150-year-old sea turtles, and even a group of vegetarian sharks! The movie won the Kids Choice Award in 2003 as well as the Golden Globe for Best Picture, Musical or Animation in 2004.



The Abyss, Directed by James Cameron (1989)

Before making the movies *Avatar, The Terminator* and *Titanic*, Canadian director James Cameron made *The Abyss*. It is an underwater adventure that involves the rescue of a submarine that had an accident. As a matter of fact, 7 million gallons of water were used to build the set for the movie! The movie won an Oscar for "Best Visual Effects".

A DEEP CHALLENGE



If anyone could take a great challenge, it would be Sir Richard Branson. He is now working on finding a way to enter the deepest part of the ocean!

by Brainwave Team

For Sir Richard Branson, nothing seems impossible. One of his subsidiary companies, Virgin Oceanic is working towards sending manned submarines into the five deepest trenches in the five oceans - The Pacific Ocean, The Atlantic Ocean, The Indian Ocean, The Antarctic Ocean and The Arctic Ocean.

The first dive is scheduled to be in 2013, when a one-man sub will dive deep into the Mariana Trench in the Pacific Ocean and explore 10km of the ocean floor there! This will only be the third time ever that such a mission would be conducted. But, since humans have only stayed at the bottom of the Mariana Trench for a few minutes, the Virgin Oceanic exploring the area around it in detail will be a huge step for humankind!

Richard Branson will himself pilot the second submarine into the Puerto Rico Trench in the Atlantic Ocean. This trench is 8 km deep.

The submarines are made from carbon fibre and titanium. Current submarines are usully made from glass reinforced plastic. According to Virgin, these vehicles have 'full ocean depth' capability, which means that they can touch the ocean floor without any damages. These submarines can travel 350 feet per minute.

After the first dive in 2013, subsequent dives will take place in the next 24 months. We can only wait and watch what things will be discovered. ■

Artwork: Saudamini Tambay

WATER, WATER EVERYWHERE!

by **Kayomarz Bacha**

How are oceans, rivers and seas different from one another? Learn while you get a chance to win a prize.

Nearly 71% of the world comprises water. However, out of this, only 1% is fit for consumption! Given that there are nearly 7 billion people on the Earth and another few million animals and birds, that is very little water!

Water on the Earth exists in the form of ponds, lakes, streams, rivers, seas, oceans and several other types of water bodies.

Ponds are formed due to meteors crashing on to earth and forming a groove. Lakes are bigger water bodies that flow into rivers, which in turn flow into seas and oceans.

But the strange thing is that though lakes and rivers contain fresh water, and flow into seas, seas are salty! How does this happen?

Here are a few questions. Research on the Internet, ask your teachers and answer them.

1. Why is seawater salty?
2. Why is there more saltwater than freshwater on earth?
3. What happens when one drinks
4. seawater? Why?
5. How is salt separated from seawater?
6. What are the various ways one can conserve drinking water? ■

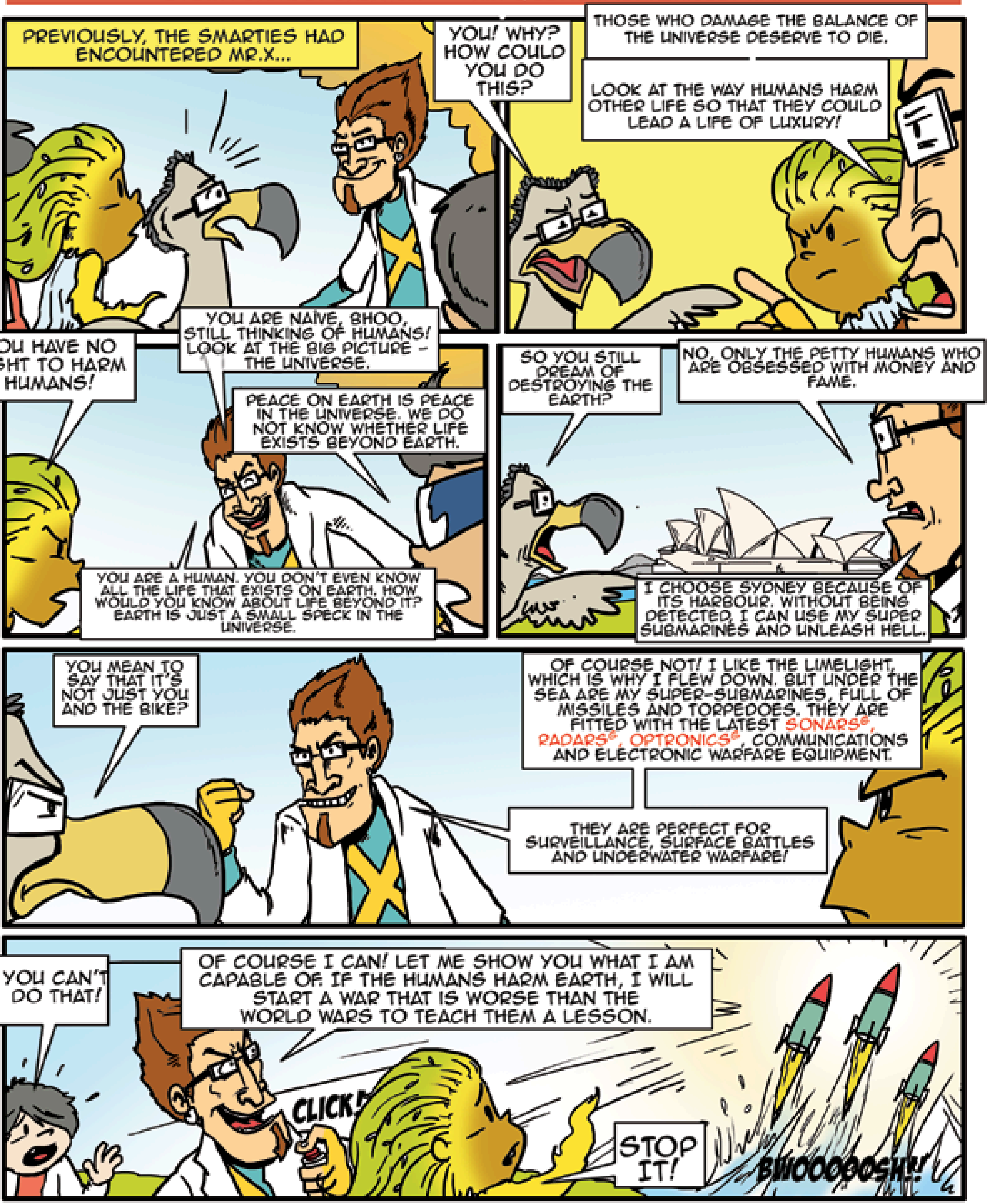
Artwork: Alicia Souza

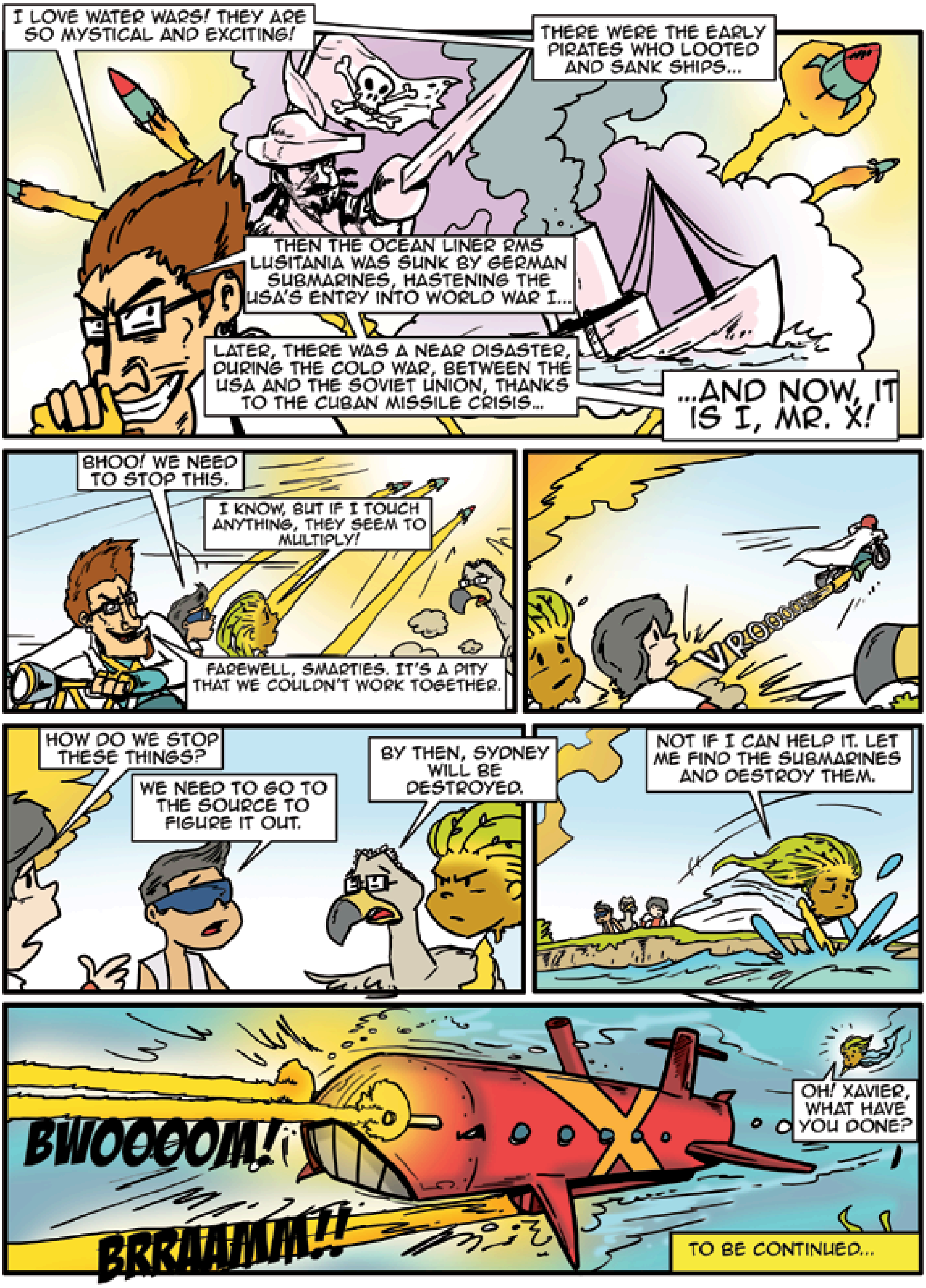
Readers who do the most comprehensive research will get a chance to be a part of our Student Editorial Board. Email your answers to *brainwave@ack-media.com* with Eye See as the subject.

THE SMARTIES

MR.X'S ESCAPE

STORY: JAYADEV CALAMUR ART & LETTERING: ABHIJEET KINI


PREVIOUSLY, THE SMARTIES HAD ENCOUNTERED MR.X...
YOU! WHY? HOW COULD YOU DO THIS?
THOSE WHO DAMAGE THE BALANCE OF THE UNIVERSE DESERVE TO DIE.
LOOK AT THE WAY HUMANS HARM OTHER LIFE SO THAT THEY COULD LEAD A LIFE OF LUXURY!
YOU HAVE NO RIGHT TO HARM HUMANS!
YOU ARE NAIVE, SHOO, STILL THINKING OF HUMANS! LOOK AT THE BIG PICTURE – THE UNIVERSE.
PEACE ON EARTH IS PEACE IN THE UNIVERSE. WE DO NOT KNOW WHETHER LIFE EXISTS BEYOND EARTH.
YOU ARE A HUMAN. YOU DON'T EVEN KNOW ALL THE LIFE THAT EXISTS ON EARTH. HOW WOULD YOU KNOW ABOUT LIFE BEYOND IT? EARTH IS JUST A SMALL SPECK IN THE UNIVERSE.
SO YOU STILL DREAM OF DESTROYING THE EARTH?
NO, ONLY THE PETTY HUMANS WHO ARE OBSESSED WITH MONEY AND FAME.
I CHOOSE SYDNEY BECAUSE OF ITS HARBOUR. WITHOUT BEING DETECTED, I CAN USE MY SUPER SUBMARINES AND UNLEASH HELL.
YOU MEAN TO SAY THAT IT'S NOT JUST YOU AND THE BIKE?
OF COURSE NOT! I LIKE THE LIMELIGHT, WHICH IS WHY I FLEW DOWN. BUT UNDER THE SEA ARE MY SUPER-SUBMARINES, FULL OF MISSILES AND TORPEDOES. THEY ARE FITTED WITH THE LATEST SONARS[6], RADARS[6], OPTRONICS[6], COMMUNICATIONS AND ELECTRONIC WARFARE EQUIPMENT.
THEY ARE PERFECT FOR SURVEILLANCE, SURFACE BATTLES AND UNDERWATER WARFARE!
YOU CAN'T DO THAT!
OF COURSE I CAN! LET ME SHOW YOU WHAT I AM CAPABLE OF. IF THE HUMANS HARM EARTH, I WILL START A WAR THAT IS WORSE THAN THE WORLD WARS TO TEACH THEM A LESSON.
CLICK!
STOP IT!
BWOOOOOOSH!!!


I LOVE WATER WARS! THEY ARE SO MYSTICAL AND EXCITING!
THERE WERE THE EARLY PIRATES WHO LOOTED AND SANK SHIPS...
THEN THE OCEAN LINER RMS LUSITANIA WAS SUNK BY GERMAN SUBMARINES, HASTENING THE USA'S ENTRY INTO WORLD WAR I...
LATER, THERE WAS A NEAR DISASTER, DURING THE COLD WAR, BETWEEN THE USA AND THE SOVIET UNION, THANKS TO THE CUBAN MISSILE CRISIS...
...AND NOW, IT IS I, MR. X!
BHOO! WE NEED TO STOP THIS.
I KNOW, BUT IF I TOUCH ANYTHING, THEY SEEM TO MULTIPLY!
FAREWELL, SMARTIES. IT'S A PITY THAT WE COULDN'T WORK TOGETHER.
VROOOOM
HOW DO WE STOP THESE THINGS?
WE NEED TO GO TO THE SOURCE TO FIGURE IT OUT.
BY THEN, SYDNEY WILL BE DESTROYED.
NOT IF I CAN HELP IT. LET ME FIND THE SUBMARINES AND DESTROY THEM.
BWOOOOM!
BRRAAAMM!!
OH! XAVIER, WHAT HAVE YOU DONE?
X
TO BE CONTINUED...

Gilly, Gilly Life

Win an exciting prize while daydreaming about growing gills and other underwater super powers!

by **Kashmira Sarode**

Harry Potter consumed gillyweed and explored a world he had never imagined: a big blue world, where he met merpeople and other mythical underwater creatures.

In the movie *X-Men: First Class*, Darwin could adapt to any situation, including growing gills to survive underwater. Banshee uses his mutation to serve as an underwater sonar system to track the antagonist's submarine and Riptide manages to create tornadoes to wreak havoc.

Artwork: Abhijeet Kini

The thought of possessing these powers is amazing. Imagine the mysteries that you could uncover if you could find your way to the ocean floor without being affected by anything! You could find fossils that would help understand the underwater world better. You could find the ruins of ancient ships and cities and maybe even find some treasure!

Possessing such powers is fascinating and could lead to some cool science, which is why we feel that you should daydream about them! ■

Write in 250 words what kind of water and underwater related powers you would love to have and how you would use them. Email your thoughts to *brainwave@ack-media.com*. You can win a copy of the latest ACK comic, Srinivasa Ramanujan!

A FISHY TALE

by **Sasikanth C**

Fishing is an activity, which is nearly 40,000 years old. In earlier times, it was a means to survive. Fishing became a hobby for people sometime in the 15th century. At that time, people would unwind by going fishing.

Ancient Egyptians were the first to carry out fishing on a large scale because of the abundance of water from River Nile. Nets were woven, boats were built from wood and metal hooks and barbs were used as baits. The concept of using a worm or fish food came centuries later. Today, the livelihood of 500 million people in developed countries depends on fishing!

Technology and fishing have grown together. There are several techniques, which use advanced technology so that tons of fish can be caught at a time.

The recreational fishermen, of course, still opt for traditional methods that involve a bait attached to the fishing rod and then, sitting on a boat to relax and unwind! ■

Image: Wikimedia Commons

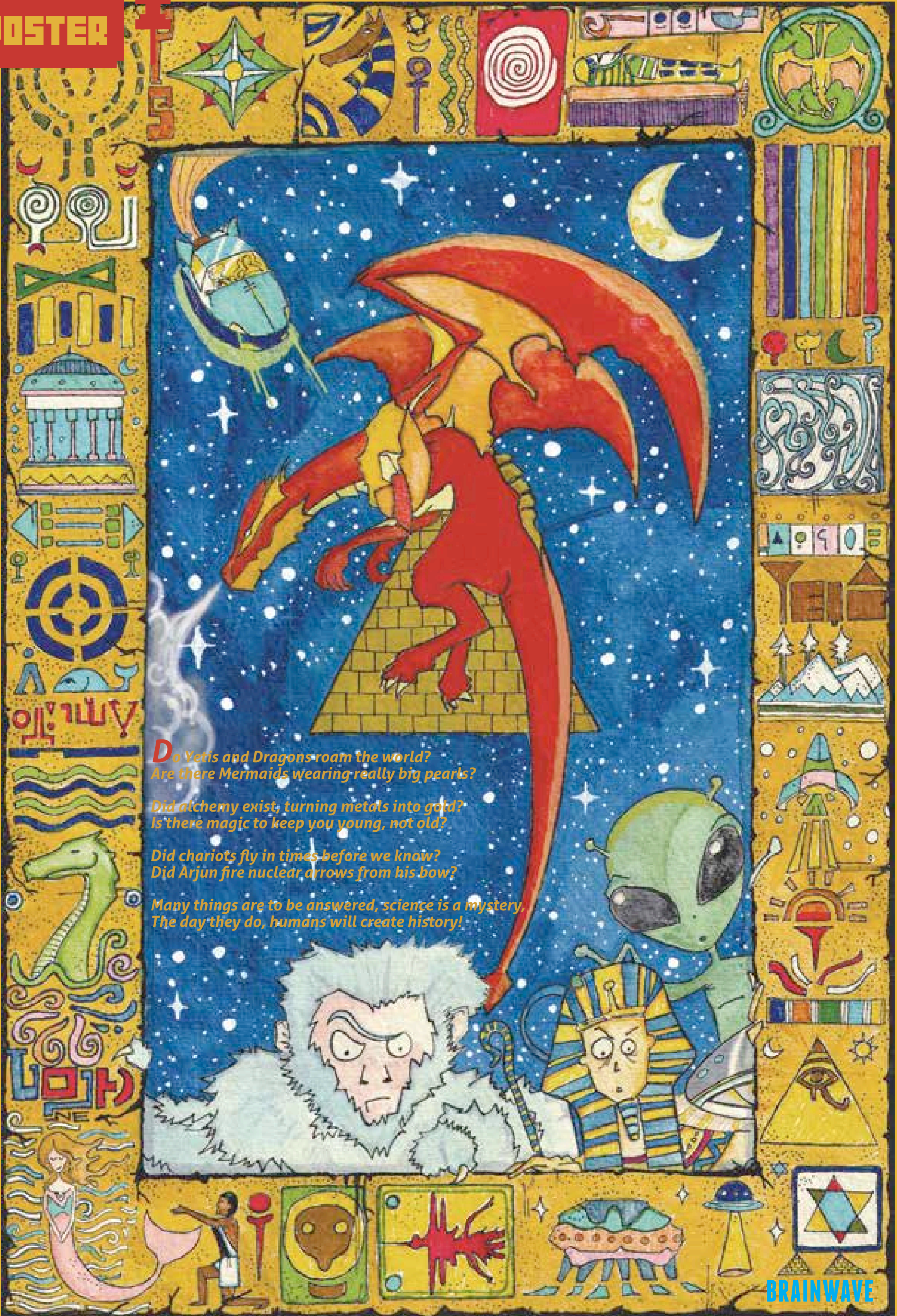
UNDERWATER ESCAPE

by **Saudamini Tambay**

American magician, Late Harry Houdini has been an inspiration for several modern-day magicians such as Criss Angel and David Blaine. Houdini's trick of escaping while his feet were cuffed and he was positioned upside down in a chamber filled with water is a legend.

During his lifetime, he was the only magician who was able to escape from this chamber. He would escape within five minutes in front of a mesmerized crowd. He once spent 91 minutes underwater, in a sealed tank, before escaping!

How he accomplished this feat is a complex case of illusions, a story for another time. But for now, know that Harry Houdini was a pioneer in underwater magic! ■



Do Yetis and Dragons roam the world?
Are there Mermaids wearing really big pearls?

Did alchemy exist, turning metals into gold?
Is there magic to keep you young, not old?

Did chariots fly in times before we know?
Did Arjun fire nuclear arrows from his bow?

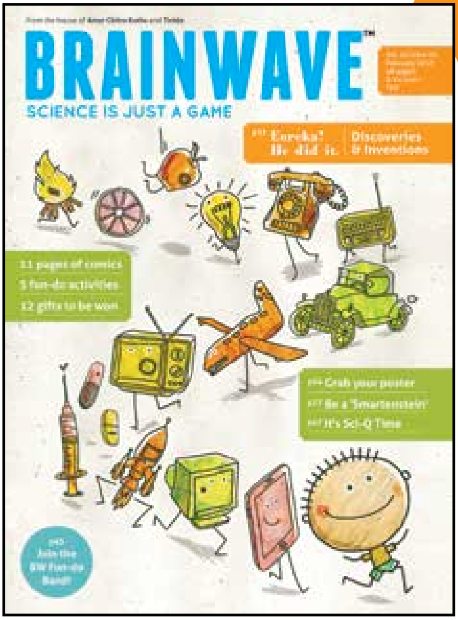
Many things are to be answered, science is a mystery,
The day they do, humans will create history!

Artwork: Sarthak Sinha

SUBSCRIBE NOW!

Pay only ₹ ~~720~~ 499!
Get 12 issues of
BRAINWAVE

30% OFF



Why pay ₹ 60 every month (that's ₹720 a year) at your news-stand to enjoy Brainwave?

Now, your magazine is the perfect balance of science and fun, which will make you call your friends and say, "Guys, let's play science!"

You get 48+ pages of comics, stories, experiments and contests. There is a Treasure Hunt too! You can win many exciting prizes and even be on our **Student Board**.

SUBSCRIPTION TYPE

- ☐ **1 year: Brainwave - ₹499**
- ☐ **2 year: Brainwae + Mystery Gift of ₹299 - ₹998**
- ☐ **1 year: Brainwave + Tinkle magazine - ₹800**
- ☐ **1 year: Brainwave + RobinAge - ₹1125**

YOUR DETAILS*

Student's Name: ____________________
Gaurdian's Name: ____________________
Date of Birth: ______________(DD MM YYYY)
Address: ____________________
____
____
City: ____________________
State: ____________________
School: ____________________
Class: ____________________
Email (Student): ____________________
Email (Gaurdian): ____________________
Tel of Gaurdian: (R): ____________________
Mobile: ____________________

____
Gaurdian's signature

PAYMENT OPTIONS

☐ **CREDIT CARD**

Card Type: ☐ Visa ☐ MasterCard

Please Charge ₹____ to my Credit card Number below:

☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐

Expiry Date: M M Y Y

____
Card member's signature

☐ **CHEQUE/DD**

Enclosed please find cheque/DD no. ☐☐☐☐☐☐
drawn in favour of 'ACK Media Direct Pvt. Ltd.'
on (bank) ____________________ ,
for the amount ____________________ ,
dated D D / M M / Y Y Y Y .

☐ **CASH:** ₹ ______________

Submit this form along with your payment to the assigned school staff member.

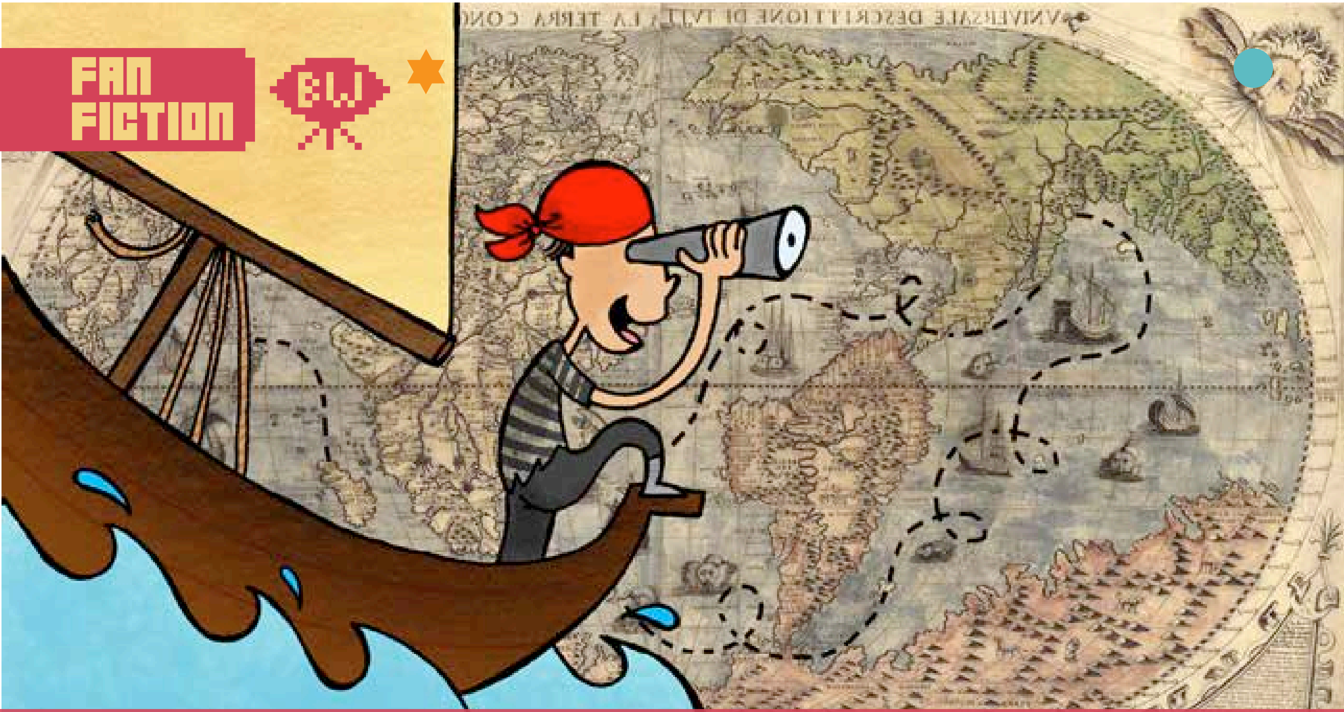
ONLINE SUBSCRIPTION

Visit: *www.amarchitrakatha.com*
Email: *brainwave@ack-media.com*

ACK Media Direct Pvt. Ltd., Krishna House, 3rd Floor,
Raghuvanshi Mills Compound, Senapati Bapat Marg,
Lower Parel (West) Mumbai - 400013.

Publisher, at its sole discretion, shall have the right to revise the offer or subscription price.

* All fields are mandatory for the subscription to be activated.



A JOURNEY AROUND THE WORLD

I recently got to know that ships first sailed in ancient Egypt, Greece and Phoenicia[G]. The Phoenicians, in particular, were some of the greatest traders at that time. This was about 2500 years ago! Others, like the Romans, used the seas to conquer the world.

With my new time machine, I decided to experience some famous sea adventures first hand! I surfed the Net and was attracted to the voyages of three great explorers – Marco Polo, Christopher Columbus and Vasco da Gama.

In 1271 A.D., Marco Polo travelled east, from Europe to China by land and sea. This was significant, as at that time, the Europeans did not have much knowledge of Asia. His journey lasted for twenty four years!

Spanish explorer Christopher Columbus, in 1492 A.D., decided to travel west to see what he would discover. He discovered the New World, which we now call North and South America!

For a long time, European traders could travel to Asia via Constantinople, which was an important port. But in 1453, Turkey captured it and closed the route. It was only in 1497 that Portuguese explorer Vasco da Gama found an alternative route via the Cape of Good Hope in South Africa and arrived in India!

Using my time machine, I met and travelled with these great men. I asked them why they embarked on dangerous voyages. Their answer was simple: The need for adventure! Also, a strong sense of curiosity made them boldly go to distant lands that no one else dared to.

During these voyages, we sailed in huge seas and vast oceans. We encountered intense storms. There were hurricanes and tornadoes, but we managed to reach our destinations safely.

When I look back at my adventures, I think that I may want to consider a career as a seaman. ■

by Prashant Kumar, *Age 14*

Email your science fiction stories to *brainwave@ack-media.com*
The best one gets published here and wins a surprise gift!

Artwork: Alicia Souza

2 1 3 SOLUTIONS AND WINNERS

Discoveries and Inventions is the right answer of January 2013's *Treasure Hunt*. The winner, Ishita Singh, wins a gift voucher. A special mention to Aditya Agrawal, Satinderpal Singh, Meenakshi Muthiah, Apoorva Kumar, Ojaswi Tiwari, Preena, Axel Blaze, Vibhu Ravindran, Aishwarya, Niveditha Varma, Mehnaz Yunus, Ruhee Parelkar, Shubha Channappa and Yash Garg.

Other winners and their prizes:
Guru Prasad *(ToyBox)* wins an ACK Comic

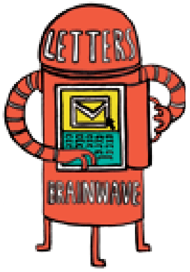
- Sanket Patil*(Be A Smarty)* wins an RC chopper
- K Revanth *(Third Law)* and Ananya Grover *(Eye See)* are nominated for the BW Student Board
- Yash Garg *(Animalia)* wins an ACK DVD
- Suyash Jaju (*Planet Ninjas)* wins an ACK comic
- Arka K (*Magic Science)* wins a gift voucher
- Jigyansu Rout (*DIY*) wins an ACK comic
- Ajeet Mahale (*Ask Us Why)* wins a Tinkle comic

To read their responses, visit
http://www.bwmag.in/category/contests

Now, participate in all activities and get a chance to win a merit certificate, the title 'Smartenstein' and a bumper gift!

Activities and contests in this issue: 'Toy Box p4', 'Ask Us Why p7', 'Eye See p19', 'Third Law p22', 'Fan Fiction p26', 'DIY p30', 'Planet Ninjas p35', 'Magic Science p35', 'BW Fun-do Band p45', 'Treasure Hunt p46' and 'Sci-Q Time p47'.

……



LETTERS FROM READERS

I love reading Brainwave. I liked the story "A Natural Labora-thor-y". I also liked 'Energy Was Never This Cool!' in the January 2013 issue.
Husain Fatehi, via Email

Dear Husain,
Thank you for your lovely mail. We are delighted that you enjoyed the issue. Keep writing and get a chance to win exciting prizes.
JD, Editor.

I just love Brainwave. It's awesome. It makes learning interesting. I tried the DIY of the January issue. I got A+ in my science project. I want to thank the whole team of Brainwave!
Mahima Pradhan, via Email.

Dear Mahima,
We are pleased that Brainwave was of help to you. Do continue writing to us.
JD, Editor.

I love reading Brainwave, its just fantabulous! It has got so many interesting columns. I read the columns, understand the concepts and apply it in science. It also has helped in my projects and various school competitions, which I won.
Nanki Arora, Ahmedabad

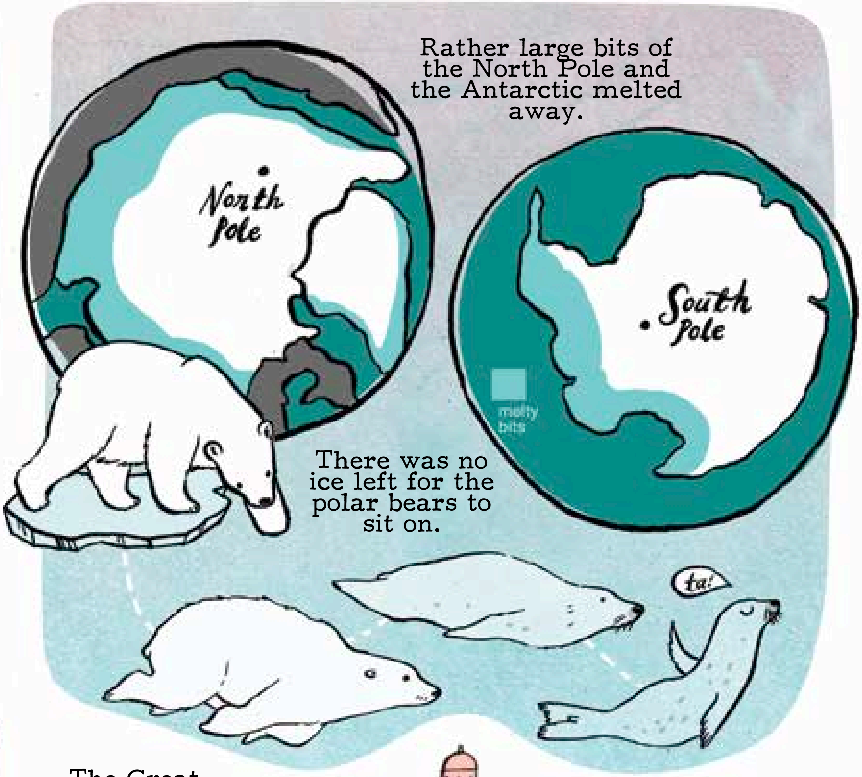
Dear Nanki,
Thank you for your wonderful feedback. We are glad that you enjoy reading Brainwave. It's encouraging to see budding science lovers like you work on experiments and demonstrate them in class.
JD, Editor.

Correction: In the January 2013 issue, we mentioned that Ohm's law was created in 1928. It is actually 1828. The error is regretted.

2100 AD: For too long had humans burned down forests and fossil fuels, and had baked way too many cakes. Atmospheric temperatures were rising degree by slow degree.

HIGH WATER

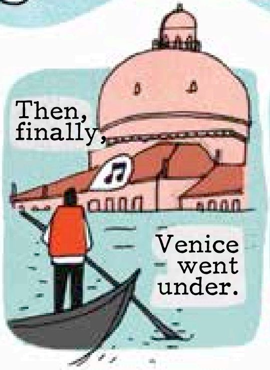
by PRABHA MALLYA



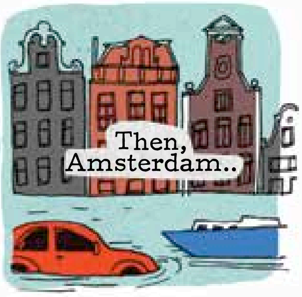
Rather large bits of the North Pole and the Antarctic melted away.

There was no ice left for the polar bears to sit on.

The Great Meltdown made sea levels rise to different extents all over the world. Some sunbathers (with not much else to do) calculated that coastlines had been advancing inwards at the terrifying rate of 3.5 mm a year.

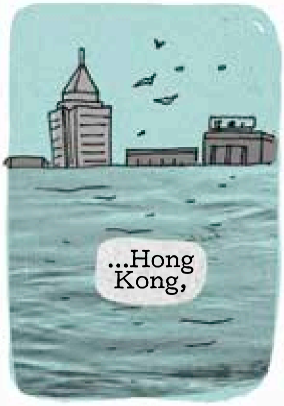


Then, finally, Venice went under.

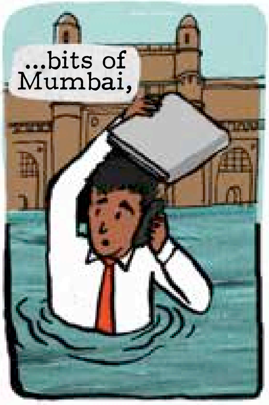


Then, Amsterdam..

...Hanoi,

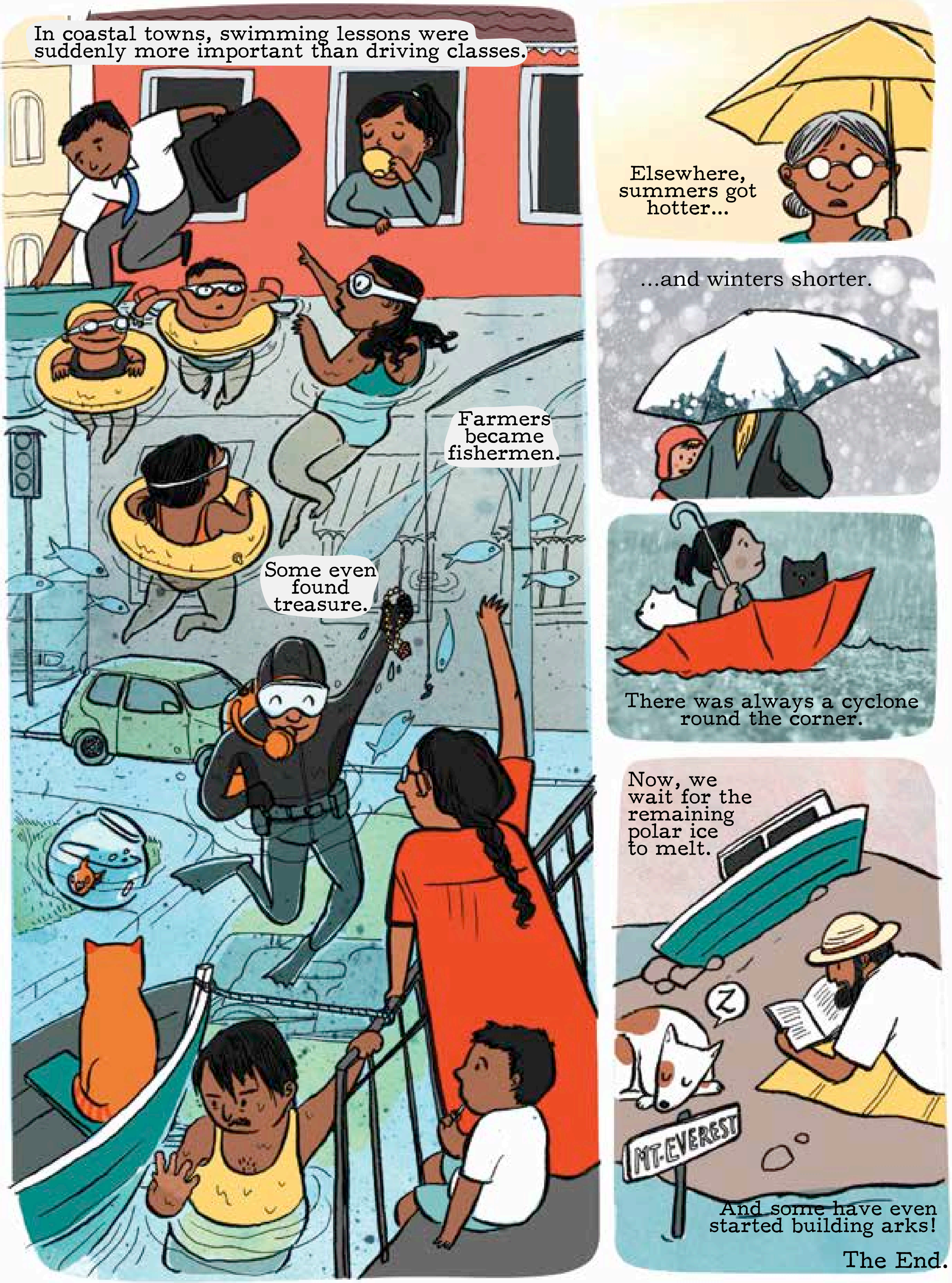


...Hong Kong,



...bits of Mumbai,

...and most of Kolkata.


In coastal towns, swimming lessons were suddenly more important than driving classes.
Farmers became fishermen.
Some even found treasure.
Elsewhere, summers got hotter...
...and winters shorter.
There was always a cyclone round the corner.
Now, we wait for the remaining polar ice to melt.
MT·EVEREST
And some have even started building arks!
The End.

DO IT YOURSELF

OCEAN IN A BOTTLE

Create your own miniature world, which is, quite literally, many million times smaller than the real one!

by **Kayomarz Bacha**

Here is a list of things you need:

- A 1 or 2 litre empty, transparent bottle
- Tap water
- Blue ink
- Cooking oil

Method:

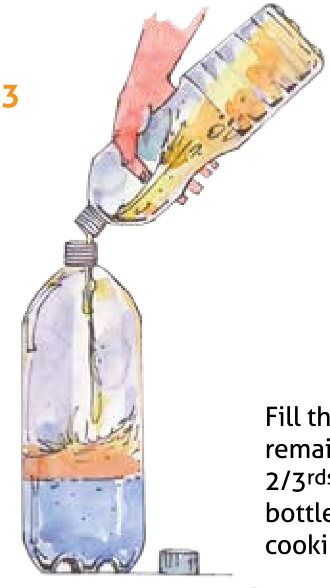
Step 01

Fill 1/3rd of the bottle with water.

Step 02

To the water, add a few drops of the blue ink and mix well.

Step 03



Fill the remaining 2/3rds of the bottle with the cooking oil.

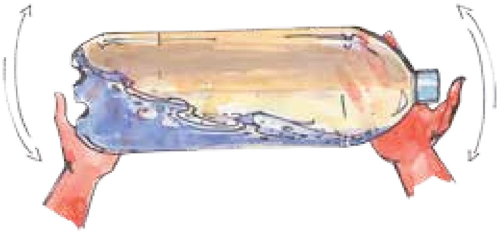
Artwork: Adarsh Achari

http://www.youtube.com/watch?v=AZtlMlkwtBg

Step 04

Close the lid of the bottle as tight as you can.

Step 05



Hold the bottle horizontally and tilt it from side to side. Vary the speeds and angles at which you tilt the bottle. Watch carefully and note your observations.

Why does this happen?

Water and oil do not mix because of the difference in their densities. The density of water is greater than that of oil. Therefore water sinks to the bottom.

Generally, if two liquids have different densities, they will mix to form a solution with its own density. This is because of the polarity[G] of liquid molecules.

In this case, water molecules are polar, whereas oil molecules are non-polar. Water molecules have a small positive charge at one end and a small negative charge at the other end. Hence, they stick to each other. Oil molecules have no charge and so, oil molecules are left out and do not mix with the water molecules.

However, there is a possibility to mix the two. Oils can be mixed with water by adding emulsifiers. Emulsifiers are ingredients used to bind non-combinative substances. Examples of such emulsifiers are detergents and soaps. Their molecules have one oil friendly end and another water friendly end. Hence, they mix water with the grime and oil from the utensils and help in cleaning!

Try this experiment at home. Send videos and photographs to *kayomarz.bacha@ack-media.com* for a chance to win a digital printed A3 size poster of the centre spread, signed by the BW Team!

Dive Right In

by **Alby and Arby**

Imagine a career where you could interact with sea turtles, hold on to dolphins or even play games with sharks! A scuba-diver's life has that and more.

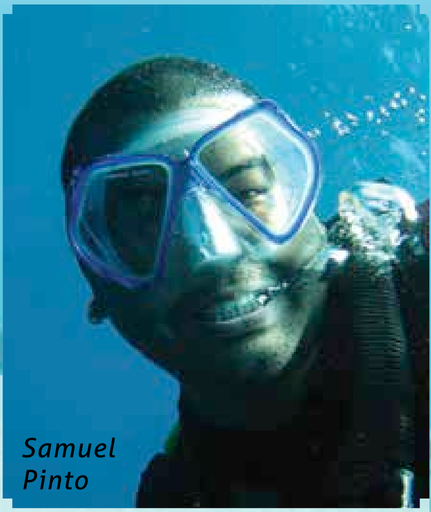

Samuel Pinto

Image source: Sharktale Scuba

Alby and Arby paid a visit to Bangalore city to meet Samuel Pinto, a scuba diver, who finally discovered his calling after juggling several jobs. A lover of wildlife, Pinto was trained in the Lakshadweep islands in India in 2007. Six years since then, Pinto has come a long way and has even opened his own scuba diving training centre, Shark Tale Scuba in Bangalore.
Excerpts from the interview:

Q. How would you describe the life of a professional scuba diver?
A. The life of a scuba diver is one with adventure, mystery, excitement, a constant adrenalin rush, peace, tranquility, discovery and so much more.

Q. What would make you say that a scuba diver's job is better than anybody else's?
A. I would not say that a professional scuba diver's job is better than anyone else's. But, how many careers that you know would pay you a normal salary and probably give you accommodation by the beach? In which job can you boast that customers become great friends?

However, for me, the best bit is that for a few hours every day, I get to enter a world so beautiful and peaceful. I see creatures staring at me wondering who and what I am.

Q. Describe the world you see underwater. What are the thrills that you get when you see so many things that most of us do not have the privilege to see?
A. The underwater world is a magical and enchanting world. It is vibrant, colourful and full of life. There is a saying in the diving community that "you would see more wild life on a coral reef than you would for hours in a forest."

As you get set, your heart starts racing, the adrenalin starts pumping, and you can feel the excitement rushing through your body. Once you are in water and begin to descend into the blue, you can feel your heartbeat slowing down and your breath easing.

Once you see the first animal on the dive, you frantically start to look around for more. You would be astonished at the coexistence of the various species, even with predators and their prey, when they are not hunting.

My favourite thing is to try to pet a passing turtle or even try to hug a dolphin. Of course, there is a different type of excitement when you see the white teeth of a grinning shark!

Q. Tell us about the best underwater experience that you have had.
A. There are countless experiences. However, if I were to let one stand out, then it would be my experience with an eagle ray. I am certain that it was its first experience too, interacting with a human!

We were at about 18 meters down and still close to the start of our dive when we noticed two eagle rays glide past us in the distance and suddenly one headed straight towards me. It stopped about three metres away from me. We both just hovered in mid-water for around 10 minutes looking into each other's eyes. I felt as if it was communicating with me. It probably wondered what this strange creature emitting bubbles was. It was quite an incredible experience!

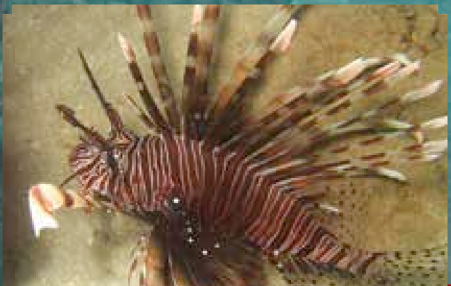
Q. How many underwater tourists do you encounter on a daily basis?
A. On a daily basis, a diving professional would meet at least five to ten new divers. I have friends all over the world and from different walks of life.

Q. Are there risks involved in a career as a scuba diver?
A. Yes there are risks, but they are minimal. As professionals we are trained to handle risks and as long as we stick to standards, obey the rules and stay within limits, there are no problems.

Q. Can children become scuba divers?
A. Yes children can become certified divers. In fact they make the best students and even better ambassadors of the ocean. A child can become a certified diver from the age of 10.

Q. Can scuba diving be a full-time career? What would you tell parents if their children want to take up careers as scuba divers?
A. Scuba diving can be a full-time career. Parents should send the child to swimming classes. They should also be encouraged to watch videos and read books about marine life, ocean geography, ocean science, etc.

A good way to start is to encourage children to be part of certified scuba diving courses. So, by the time they are 18, they are professional divers. This can also help reduce costs later. To know more, you can contact me at *sharktalescuba@india.com*



While sights like these are a television experience for everyone else, for a scuba diver, it is everyday! Image source: Shark Tale Scuba

There is a lot of scope in marine biology. It is a great career and scuba diving is part of it. Other career options include underwater photography and videography, as well as underwater archaeology. For more information you can write to us at *bwlab@ack-media.com*

AN UNDERWATER RIDE

by **Saudamini Tambay**

Take a ride in a car, a plane, and a scooter and instead of zooming on land or in air, have an amazing underwater adventure!

With the advancement of technology, do not be surprised if one day, sometime in the not-so-distant future, humans will be able to explore the bottom most parts of the ocean floor. Inventors have already started taking giant leaps to achieve this, through amazing technology.

The Underwater Car

This car became popular in a James Bond movie titled *The Spy Who Loved Me*. In the movie, James Bond drove a Lotus Esprit car that is converted into a submarine when under water. This has now become a reality! Rinspeed, a Swiss company, has invented a car called 'sQuba' that can go underwater. The car's regular engine has been replaced with three electric motors at the back. One motor runs on lithium ion battery for the vehicle to move on land, while the other two are twin water jets for moving underwater.

The Underwater Plane

Sir Richard Branson is at it again. Not satisfied even with owning Virgin Galactic, a space tourist shuttle, he has also invented the aero-submarine, Necker Nymph, an underwater plane! This plane can go up to 130 feet below sea level. It seats one pilot and two passengers in an open cockpit, which makes it necessary to wear scuba gear. The plane can travel up to a speed of 6 knots, which is about 11 kmph.

The Underwater Scooter

Thanks to the Scooba-Doo, a water scooter, zipping underwater is a reality! The scooter, which is US $17,000, contains an electric motor to drive it. The propeller is separated from the driver by a protective cage. The scooter retains its buoyancy when not powered so that it can float on water. It also carries a headgear and holds more than one oxygen cylinder, making underwater exploration more exciting. ■

Image source: Wikimedia Commons

A TOXIC PROBLEM

by **Dr. Dodo**

Brainwave investigates water pollution, which is a cause for several diseases.

A polluted river; Wikimedia Commons

Although 71% of earth is water, only 1% of this is fit for drinking. Along with this shortage, increasing water pollution has made life difficult. Polluted water is responsible for diseases such as cholera, typhoid, jaundice, malaria and dengue. Water pollution has plagued us for centuries. Even in ancient times, civilizations had to construct aqueducts to obtain clean drinking water.

Sadly, as technology improved, pollution increased. Today, along with human waste, household chemicals, fertilizers, industrial by- products, batteries and spoilt electronics are also dumped in water!

The Japanese city of Minamata still suffers the consequences of water contamination. With rapid industrialization in Japan, from the 1930s to the 1950s, mercury was released as waste into water. People consuming fish here have had nerve-related disabilities. In some cases, people lost their eyesight and had organ failure. This condition is known as Minamata disease.

Also, marine life contributes significantly to the oxygen cycle, more than all the trees on land put together! Harming them would harm us in the long run.

Do you have ideas to prevent water pollution? Discuss with friends, research on the internet and prepare a list of such ideas. Email them to us at *brainwave@ack-media.com* to win the latest issue of Tinkle Double Digest.

Wat-a Mirror!

MAGIC SCIENCE

by **Kayomarz Bacha**

Draw a left arrow on a piece of chart paper. Use support and make this stand vertically on your reading table. Place an empty transparent glass about eight inches in front of the arrow. Look at the arrow through the glass and observe.

Now, fill the glass with water and look at the arrow again, through the glass. What do you notice?

What do you think this is - magic or science?

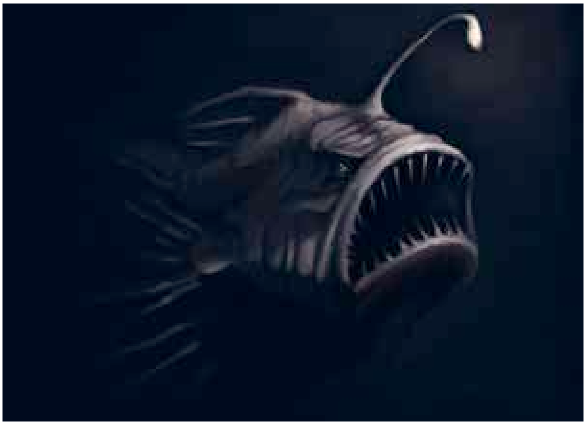
Research and tell us how this happened. Write to *kayomarz.bacha@ack-media.com* and get a chance to win an Amar Chitra Katha animation CD!

http://www.youtube.com/watch?v=YdCVT2qhTHs

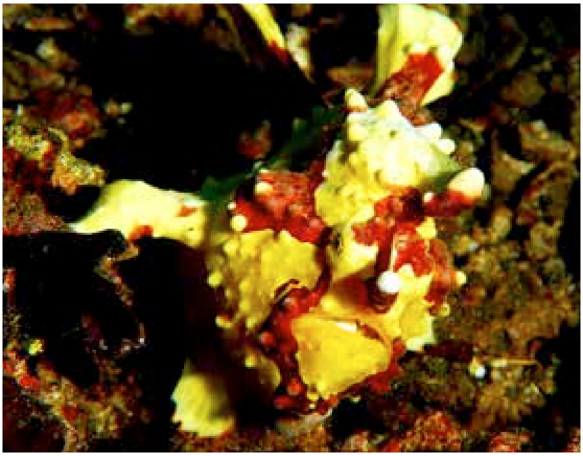
Encounter Special

by **Dr. Dodo**

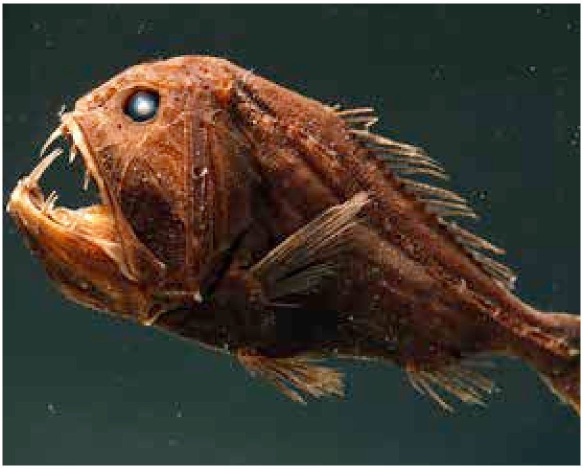
Encounter some of the lesser-known underwater creatures, some of which can scare and snare!



Angler; Wikimedia Commons



Clown frogfish; Wikimedia Commons



Fangtooth; Wikimedia Commons

According to statistics, there are approximately 2.2 million species of plants and animals living in the sea. However, since the oceans have not yet been fully explored, scientists estimate that there could be an estimate between 1 and 10 million species!

In a quest to understand underwater life, humans have, for many years, explored the deep seas and oceans. They have encountered several creatures, some small and some scary:

Angler: The angler is a scary-looking creature. It is in fact, a small species of fish that feeds on other fish. It has glowing organs strategically positioned on its body. These organs serve as bait for fish that it preys upon.

Clown frogfish: This species keeps a low profile and uses the art of camouflage to protect itself from predators. It has a number of spots, stripes and other patterns that help it resemble surrounding rocks or plants.

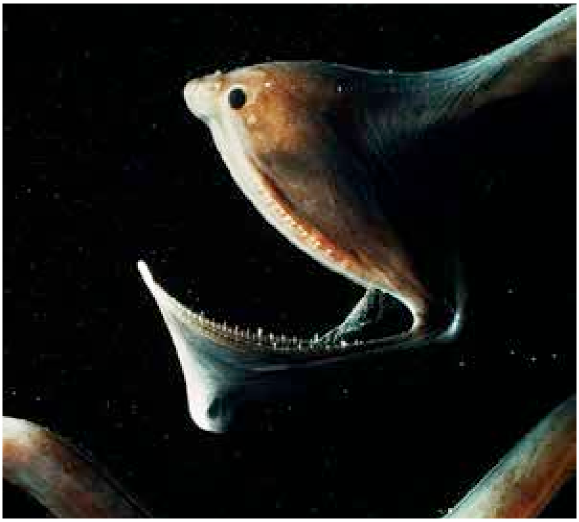
Fangtooth: The fangtooth is named so because of its sharp fangs that it uses to catch its prey. It is found in the deep ocean waters. It is mainly found off the coast of Australia.

Giant squid; Wikimedia Commons

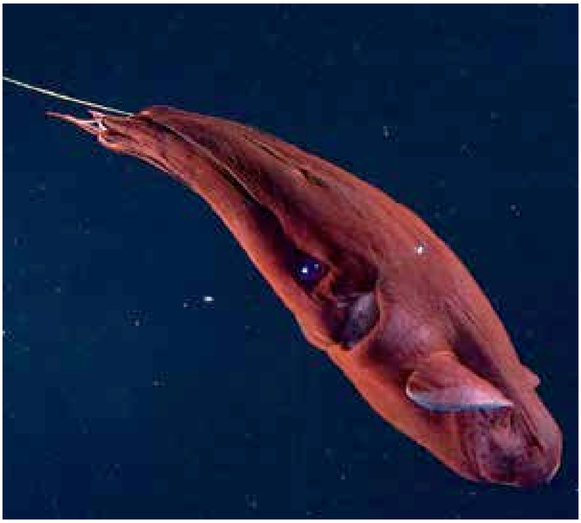
Giant squid: The giant squid is one of the world's largest animals. It can grow up to a length of 60 feet. It is the largest invertebrate in the world. This squid is so large that whales have been found in its stomach! According to some, giant squids devoured their shipmates! While there is no documented proof that this has occurred, people fear this creature.

Gulper Eel: The gulper eel is a strange looking fish. This is due to its large mouth. This mouth is so large that the eel can swallow a creature that is two times larger than itself. Its stomach can be adjusted to accommodate these large meals. It is found in all of the world's oceans at depths ranging from 3000 to 6000 feet.

Vampire squid: This vampire squid looks more like a jellyfish than a squid, and looks as if it has come straight out of a sci-fi movie. It is small, growing to a length of about six inches, but has globular eyeballs as large as the eyes of a large dog. This creature definitely is one that you would never want to encounter! ■



Gulper eel; Wikimedia Commons



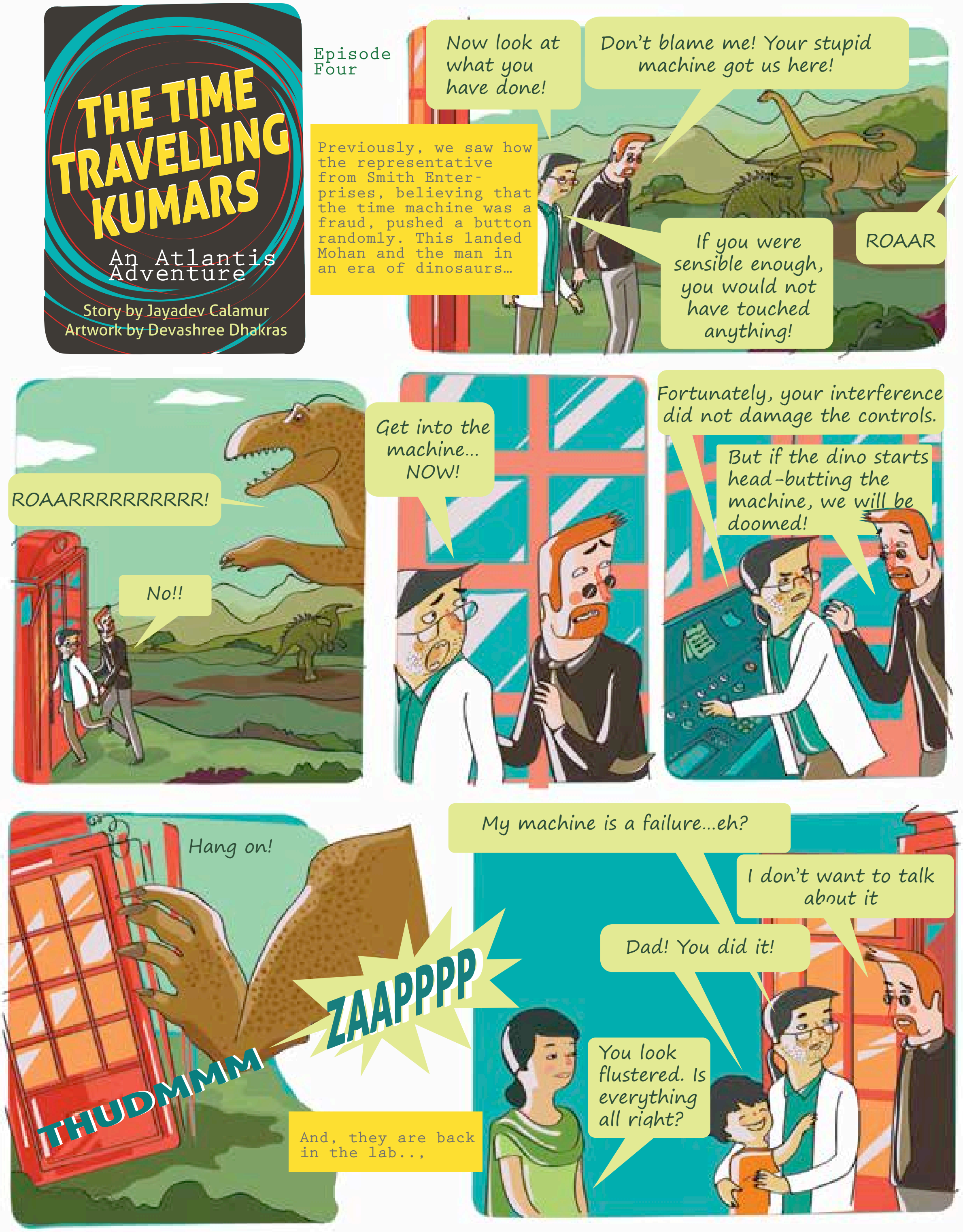
Vampire squid; Wikimedia Commons

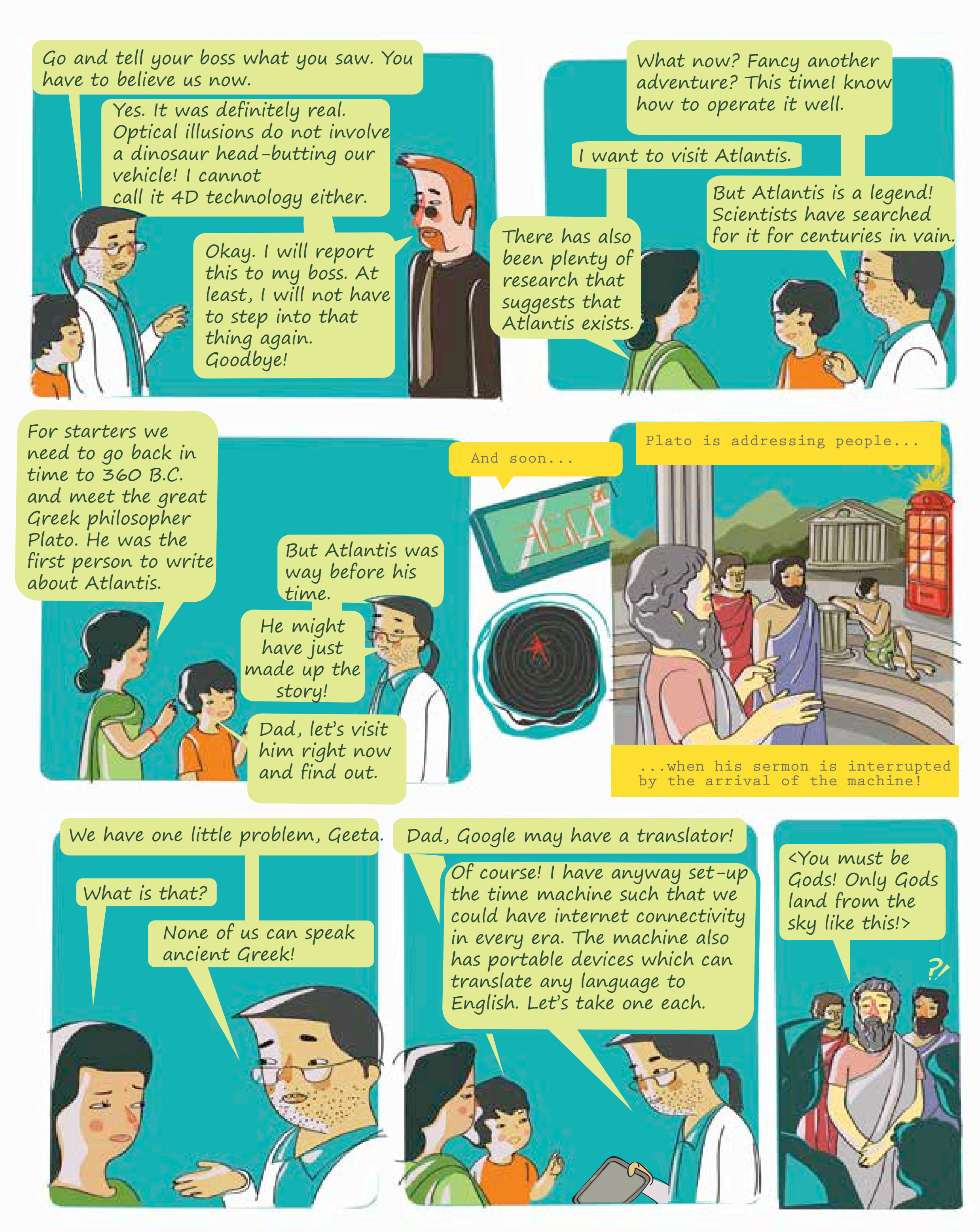
THE TIME TRAVELLING KUMARS

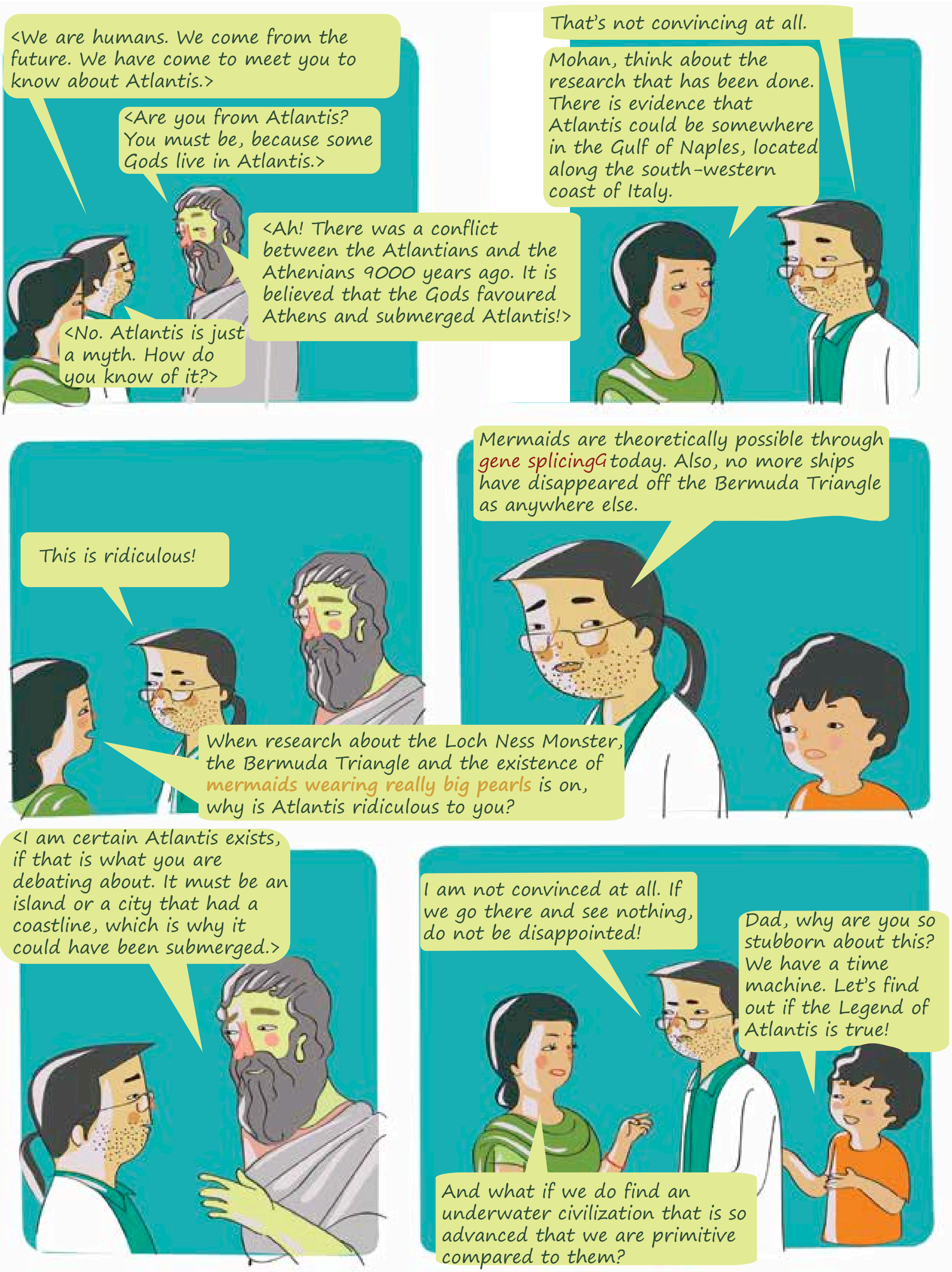
An Atlantis Adventure

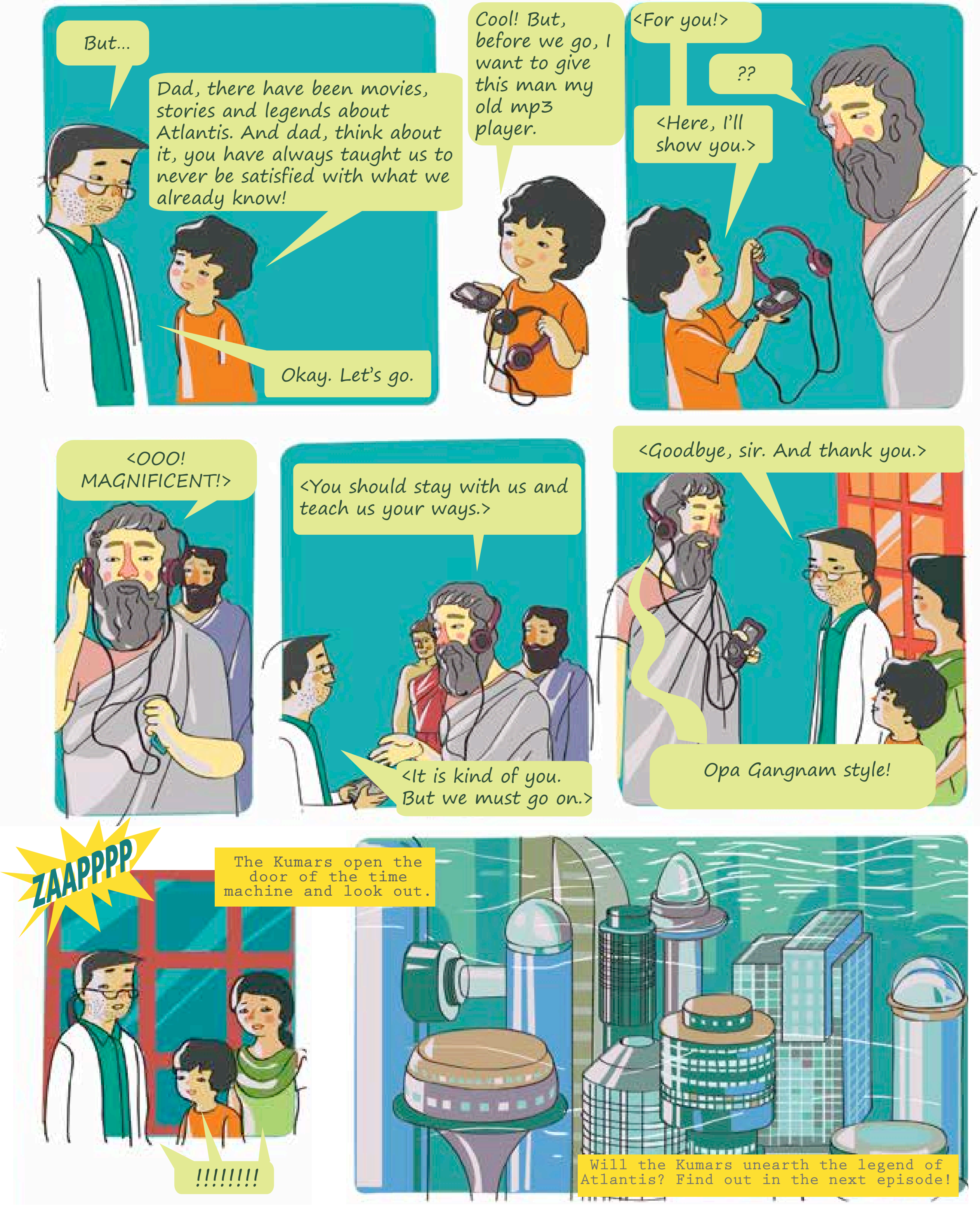
Story by Jayadev Calamur
Artwork by Devashree Dhakras

Episode Four


Previously, we saw how the representative from Smith Enterprises, believing that the time machine was a fraud, pushed a button randomly. This landed Mohan and the man in an era of dinosaurs…
Now look at what you have done!
Don't blame me! Your stupid machine got us here!
If you were sensible enough, you would not have touched anything!
ROAAR
ROAARRRRRRRRRR!
No!!
Get into the machine… NOW!
Fortunately, your interference did not damage the controls.
But if the dino starts head-butting the machine, we will be doomed!
Hang on!
ZAAPPPP
THUDMMM
And, they are back in the lab…
My machine is a failure…eh?
I don't want to talk about it
Dad! You did it!
You look flustered. Is everything all right?

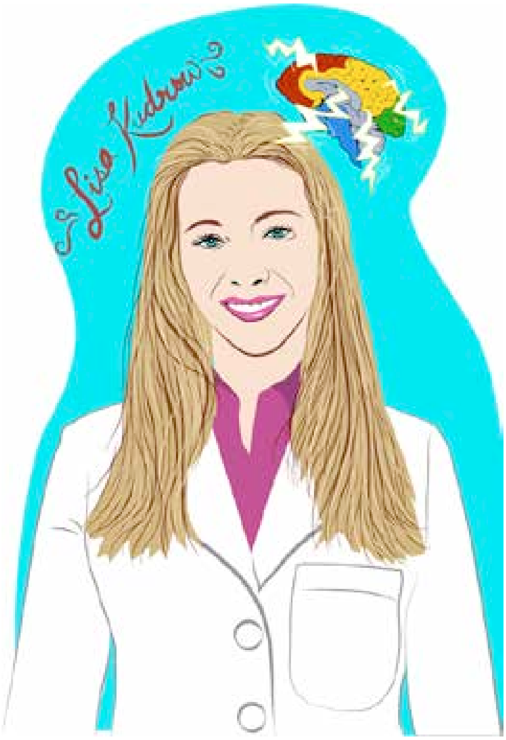

Go and tell your boss what you saw. You have to believe us now.
Yes. It was definitely real. Optical illusions do not involve a dinosaur head-butting our vehicle! I cannot call it 4D technology either.
Okay. I will report this to my boss. At least, I will not have to step into that thing again. Goodbye!
What now? Fancy another adventure? This timeI know how to operate it well.
I want to visit Atlantis.
But Atlantis is a legend! Scientists have searched for it for centuries in vain.
There has also been plenty of research that suggests that Atlantis exists.
For starters we need to go back in time to 360 B.C. and meet the great Greek philosopher Plato. He was the first person to write about Atlantis.
But Atlantis was way before his time.
He might have just made up the story!
Dad, let's visit him right now and find out.
And soon...
Plato is addressing people...
...when his sermon is interrupted by the arrival of the machine!
We have one little problem, Geeta.
What is that?
None of us can speak ancient Greek!
Dad, Google may have a translator!
Of course! I have anyway set-up the time machine such that we could have internet connectivity in every era. The machine also has portable devices which can translate any language to English. Let's take one each.
<You must be Gods! Only Gods land from the sky like this!>
?!


<We are humans. We come from the future. We have come to meet you to know about Atlantis.>
<Are you from Atlantis? You must be, because some Gods live in Atlantis.>
<No. Atlantis is just a myth. How do you know of it?>
<Ah! There was a conflict between the Atlantians and the Athenians 9000 years ago. It is believed that the Gods favoured Athens and submerged Atlantis!>
That's not convincing at all.
Mohan, think about the research that has been done. There is evidence that Atlantis could be somewhere in the Gulf of Naples, located along the south-western coast of Italy.
This is ridiculous!
When research about the Loch Ness Monster, the Bermuda Triangle and the existence of mermaids wearing really big pearls is on, why is Atlantis ridiculous to you?
Mermaids are theoretically possible through gene splicingG today. Also, no more ships have disappeared off the Bermuda Triangle as anywhere else.
<I am certain Atlantis exists, if that is what you are debating about. It must be an island or a city that had a coastline, which is why it could have been submerged.>
I am not convinced at all. If we go there and see nothing, do not be disappointed!
Dad, why are you so stubborn about this? We have a time machine. Let's find out if the Legend of Atlantis is true!
And what if we do find an underwater civilization that is so advanced that we are primitive compared to them?


But...
Dad, there have been movies, stories and legends about Atlantis. And dad, think about it, you have always taught us to never be satisfied with what we already know!
Okay. Let's go.
Cool! But, before we go, I want to give this man my old mp3 player.
<For you!>
??
<Here, I'll show you.>
<OOO! MAGNIFICENT!>
<You should stay with us and teach us your ways.>
<It is kind of you. But we must go on.>
<Goodbye, sir. And thank you.>
Opa Gangnam style!
ZAAPPPP
The Kumars open the door of the time machine and look out.
!!!!!!!!
Will the Kumars unearth the legend of Atlantis? Find out in the next episode!

THE GENIUS CELEB

by **Sarthak Sinha**



Read about a few celebrities who are not only popular but also quite ingenious!

While many celebrities are in the news for some outstanding philanthropic work, others have been exceedingly smart and respected for their brains.

A 'NEURO' FRIEND

Lisa Kudrow, who is famous for her role as Phoebe Buffet in the popular American comedy series *Friends*, is quite a genius. Her academic records back this thought. She holds a Bachelors of Science degree from Vassar University, New York and began a career as a neurologist. After eight years of researching headaches, she decided to take a stab at acting and has been doing it ever since!

HE-MAN IS A GENIUS

Hollywood actor Dolph Lundgren, who is famous for playing the 'bad guy' in one of the *Rocky* movies, as well as for playing the superhero He-Man in the 1987 movie *Masters of the Universe*, is one smart guy. He reportedly worked as a bouncer at a restaurant in Boston that was frequented by students from MIT. The story goes that Lundgren had a love for science and would help the students solve their problems by calling them to the backroom of the restaurant. Anything for the love of science!

KUMBLE'S ENGINEERING SPIN

Former India cricket captain Anil Kumble is a trained engineer. He graduated from Rashtreeya Vidyalaya College of Engineering in Karnataka, India with a degree in mechanical engineering. His teammates would often make fun of him saying that his engineering degree helped him bowl the ball in such a way that he would end up with many wickets on the crumbling pitches in India. Kumble took the joke in his stride and ended his career with over 600 test wickets!

Artwork: Nimisha Saikia

PROOF IT UP

by **Sasikanth C**

Fancy dunking a mobile phone in water?
Thanks to underwater tech, you might get away with it!

Waterproof technology is here to stay. The fact that we can dive into the ocean without worrying whether our cameras or watches could get damaged is fascinating. Today, even mobile phones and mp3 players that work perfectly well underwater exist!

In the 1980s, plastic covers that could not harm lenses or damage the device were used to take cameras under water and shoot photos.

Beyond a certain depth, the water pressure is so high that the equipment may crack. This is the reason underwater devices have screens and lenses thicker than the ones in regular equipment. Each gadget also specifically mentions how deep you can go without causing any harm to it.

Today, cameras have special cases that are made of plastic or aluminium. These cases are airtight, preventing water from entering. Control knobs on the casing control the way cameras are used while they are in their case.

The underwater mobile phone, however, is a lot more advanced. Developed by an Italian company, Ocean Reef, the phone comprises of a speaker and a microphone that are connected to the diver's mask. The outer portion of the mask consists of a water-resistant box that holds a Bluetooth device.

But not many would opt for such a cell phone. People would want something that prevents their regular phones from getting damaged when they accidentally get wet. Waterproof nano-coating is the technology that enables this. A few companies have started using polymers that repel any liquid off the surface and keep the gadget safe in water. To maintain secrecy, the companies have not mentioned the material they use to coat their gadgets.

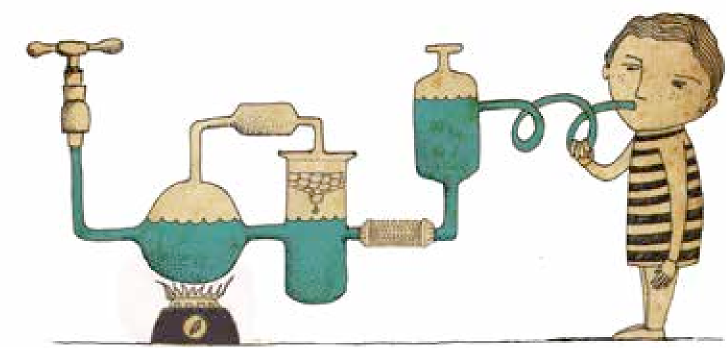
In a few years, ads might dare you to dunk your phones in water just like you now do with Oreos and milk! ■

Artwork: Saudamini Tambay

A Pure Solution

by **Brainwave Team**

Purify water at home in six easy steps, without a water guard.



We know that pure water is necessary for consumption. We purify water to ensure that it is free of infection and safe to drink. But can we purify water at home?

1 Clean the metal container in which water is to be stored. Wash it with soap and rinse thoroughly so that no soap remains.

2 Filter water through a clean cloth made from cotton or muslin. A clean handkerchief will also do. Allow the water to settle.

3 Add a little alum powder to the water and stir for five minutes. This enables the impurities to clot and settle to the bottom.

4 Boil the water till bubbles form. Let it stay on the stove for about a minute and then, rest.

5 Once the water is purified, do NOT dip your fingers in it as it may contaminate the water.

6 Store this water in a vessel with a proper and clean cover. The water ready to be consumed.

Artwork: Saudamini Tambay

Join the BW FUN-DO BAND

Win gifts through out the year while you learn with fun!

Every month, the top group wins goodie-bags with posters, comics, CDs, cool BW friendship bands and more.

At the end of each year, top 5 groups win the BW Fun-do Band 'Hall-of-Fame' certificates, mementos and t-shirts!

Every year, the best group will also win a rolling shield.

5 easy steps!

Step 1

Form a group with four other friends who are not subscribers of Brainwave.

Step 2

Give your group a name (e.g. The Smartensteins) and choose a captain.

Step 3

Email the full names of your group, members and captain to brainwave@ack-media.com

Step 4

Click on the website link that we email to each of you and register.

Step 5

As a group, perform DIY (P30), Toy Box (P4) and Magic Science (P37) every month. Submit your observations and start winning!

Go, gather your friends now and have five times the fun!

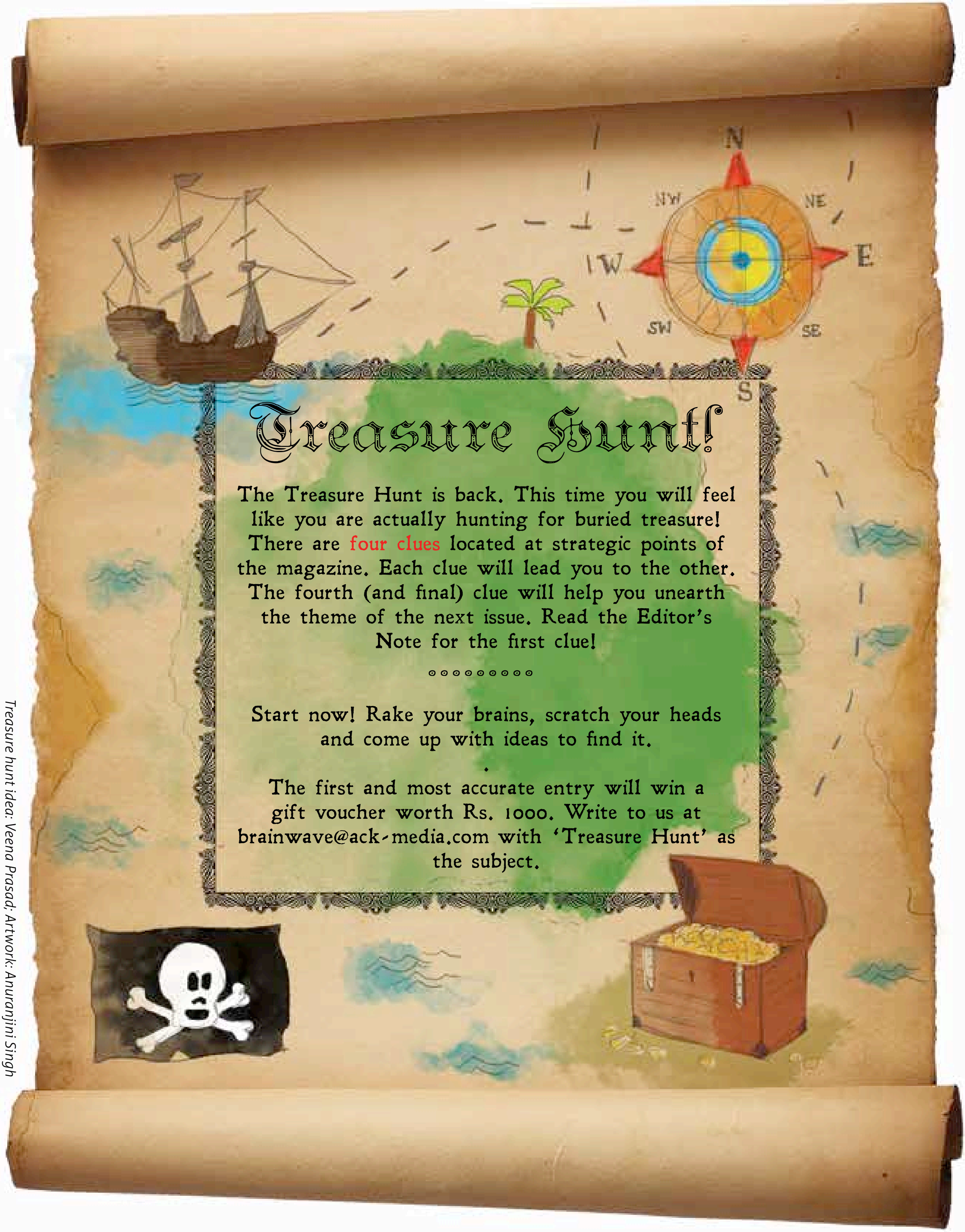
BW SCIENCE SUPERTEACHER

We all have teachers who inspire us to love science and to ask questions with an open mind. They could be at school or they could be friends and family members.

Nominate them for the BW science superteacher awards and let the world know about them!

Email their name and school along with 100 words on why you are nominating them to brainwave@ack-media.com

Artwork: Kashmira Sarode



Treasure Hunt!

The Treasure Hunt is back. This time you will feel like you are actually hunting for buried treasure! There are four clues located at strategic points of the magazine. Each clue will lead you to the other. The fourth (and final) clue will help you unearth the theme of the next issue. Read the Editor's Note for the first clue!

* * *

Start now! Rake your brains, scratch your heads and come up with ideas to find it.

* * *

The first and most accurate entry will win a gift voucher worth Rs. 1000. Write to us at brainwave@ack-media.com with 'Treasure Hunt' as the subject.

Treasure hunt idea: Veena Prasad; Artwork: Anuranjini Singh

SCIENCE GLOSSARY

p07

Retina: The light-sensitive layer of tissue located in the back of the eye that enables vision.

Refractive index: The refractive index is the measure of the bending of a ray of light when passing from one medium into another.

p10

Earth Similarity Index: It is a measure of how physically similar a planet is to Earth.

Habitable Zone Distance: The distance of a planet from a star that enables life.

Global Primary Habitability: It reflects whether the estimated surface temperatures are suitable for life.

p13

Mariana Trench: The Mariana Trench in the Pacific Ocean is the deepest trench in the world. The deepest part of the trench, the Challenger Deep, is 10,898m deep.

Bar: Unit of pressure. 1 bar = pressure exerted by 6 kilos.

p15

Coral reefs: Coral reefs are formations of mostly rocks that are built over time by corals and other organisms. It exists only in saltwater, typically in shallow, coastal areas.

p20

Sonar: It uses sound waves sent through water to detect objects as the waves bounce off them.

Radar: A method of detecting objects and determining their position, velocity or other characteristics by analysis of very high frequency radio waves reflected from their surfaces.

Optronics: Optronics or optoelectronics is the study and application of electronic devices that source, detect and control light.

p31

Polarity: The tendency of forming distinctive opposing charges based on the orientation of chemical bonds of the molecule.

p40

Gene splicing: The technology by which DNA molecules of different organisms are cut up and joined together through advanced technology.

Sci-Q Time!

Finished reading the magazine? Answer these simple questions to win a mystery gift worth Rs. 200.

1. How do mammals such as whales and dolphins breathe air underwater?

2. Which discoverer sailed to the United States in 1492?

3. What is bioluminescence? What does Angler fish use it for?

4. What is water-proof nano coating?

5. What is alum? How does it help in water purification?

Parents and teachers, make science a game that children love to play:
www.facebook.com/groups/BW.PTE.Collab/

Our website: www.bwmag.in

Readers, get to see behind the scenes:
www.facebook.com/brainwavemag

CELEBRATE YOUR UNIQUENESS WITH THE BEST IN STATIONERY.

- Vibrant colours that are child-safe

- Smart, stylish cover designs
- Made from eco-friendly ECF paper

- Erasers: child-safe, non-toxic & phthalate free
- Geometry Boxes: die-casted, self-centering compass & divider for greater precision
- Pencils: specially designed lead that's smooth & reduces wear-out
- Pens: engineered for controlled ink flow, designed for faster & smoother writing

India's most popular stationery brand, Classmate, brings you the very best in stationery. Because you are one of a kind.

Scan with your smartphone &
join us on facebook/classmate

classmate
BECAUSE YOU ARE ONE OF A KIND

RNI No. MAHENG/2012/42382

WHAT IS BRAINWAVE?

Brainwave is a children's science magazine from the house of Amar Chitra Katha and Tinkle.

We understand that each child has a different aptitude and love for science. Hence, we simplify science into forms that excite them - comics, stories, fun-do activities, contests and fascinating facts.

Give your child a Brainwave, and science will be just another game!